

## The Optimization of the Quality / Price of the Subject and Tectological Functions

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**ABSTRACT:** *The paper present the rule that determines quantitative dependency between object's potential, its form and matter as well as several other philosophical categories that is never described before and that makes contribution to revelation of the essence of unity of nature and tectology. Described dependency provides the common method of calculation of potential characteristic of objects of any nature and complexity and common method of their structure disclosure in Hilbert space. Based on the proposed functions, optimization of resources allocation to object's lifecycle method is created.*

**Keywords:** *tectological function; structure; effectiveness; model.*

### I. INTRODUCTION

With deep human antiquity interested in the question - how to create this or that object higher quality and lower price. Obviously, you need to determine first what we mean by the subject, the characteristics of the object and the amount of funds that provide object lifecycle.

Under the subject is invited to realize any, with which confronted the man himself, that surrounds it, animate, inanimate, material (inorganic and living), abstract, material and abstract that it creates, that is the object or the source of any activity, any condition or attitude that its content is thought speech.

Referring generally subject has multiple characteristics of one-dimensional dimension. The combination of all the characteristics of the object and determine the size of the object and distinguish it from other objects. The subject, therefore, it is possible and appropriate to define this totality, its ability to perform specified functions, comply with their intended use. We call such a set of potential subject matter.

The life cycle of the subject, including the design, creation, use and disposal of the product. For all of these steps, funds are allocated, which, depending on their distribution between the cost of the life cycles of the elements of the subject determine the potential of each stage and the product itself. Indeed, only limited distribution means ensuring the creation of a control system, between their parts providing such management features as output control commands and these commands to bring their perpetrators may change capacity control system in a wide range.

If it happens that the amount of funds allocated for the maintenance of creation of one of said parts of the control system, designed to get all the money management system, the potential tends to zero the control system. Clearly, there is a certain optimal ratio values of these parts means, in which the control system capacity is maximized and the deviation in either direction from this optimum their ratio would lead to its reduction without the change amount of funds allocated for the creation of a whole control system . Naturally, such a law reducing the capacity of the subject is of interest not only for the creators of the said system.

Thus, to define the tasks of identifying the subject of the elements that determine the potential ratio of the potential subject, and the mathematical relationship between these potentials.

Use linear programming to solve this problem is very challenging due to the high complexity of the subject, including in some cases the potentials of various officials of functioning of systems of algorithms, all kinds of information technology systems and software. The potentials of these elements have different dimensions of multi-dimensional, not to compare their potentials and are determined only by experts, contributing a human error. So it took to review the achievements of science, which once might help solve the problem of the disclosure of the structural and functional analysis of complex systems and quantitative ratios of their elements. Behavior ratios previously specified similar potentials management system, for example, the behavior of the form and content of the subject.

On the relation between form and content of a potential subject for the last two thousand years it is written and talked a lot. This relationship with the ancient is the focus of aesthetic exercises. On it paid attention

many philosophers since Aristotle. President of the USSR Academy of Sciences Vavilov on the occasion of the anniversary of Lucretius noted [1]: "What is the strength of Lucretius? In his poetry there, fine, but, according to many, inferior to Virgil, Ovid, and many others? In its outlook, and whether learning, in which he mostly follows his deified their teacher Epicurus? No attractiveness Lucretia is in either individually. She lies, undoubtedly, in a spectacular, single performance at the confluence of the eternal self-righteous and breadth of the philosophical content of the poem, with its poetic form."

How to measure the effectiveness of the merger of form and content of a work of art, how to determine the effectiveness and ineffectiveness of their merger, the President of the USSR Academy of Sciences Vavilov did not offer. How to measure the effectiveness of the merger of form and content items such as watches, residential or industrial building, jet, aircraft carrier, command and control system and weapons, the state government, etc. etc. unknown.

To some understanding of such problems come closest Napoleon and Engels. As noted by historian E.V. Tarle [2], "Napoleon, with his original way of speaking, likened the complex qualities of a good commander to the square, where the base and height are always equal: under the base then he understands the character, courage, courage, determination, and under height - the mind, the intellectual qualities. If the mind is stronger than nature, that he, by contrast, lack the courage to carry out his plan." Engels said two "axles" military system [3] "... means massive dimensions as attacks humans, horses and implements, on the one hand, the mobility of the offensive and the device - on the other. However, if there is enough listed Napoleon qualities that completely define a good leader. Why is there no such quality as general knowledge (knowledge of tactics, strategies, capabilities of its troops, weapons, movement of forces troops, psychology, intelligence, and much more). If the knowledge of the commander is no less important than his will or mind, the square becomes a cube. How do the different qualities of the commander on his potential. Is it enough to Engels referred to the characteristics of the military system. Why among them there are no such as a state personnel and military forces of the system management quality, the quality of guns, ammunition, forage for horses and more.

To answer these questions seek a solution of the number of similar problems with their decisions known. In the formulation of such problems, obviously, have to be conditions: aspiration to zero potential of each of the elements directs potential Objects to zero, changing the value of the capacity of each element changes the value of the potential of the object itself. Such examples are found. Among them is the law of Archimedes, Newton's second law, Ohm's law, the relationship between the energy of the magnetic field, the inductance of the conductor and the flowing electric current through it, the expression area of the rectangle, etc. .. Consideration of these and other examples suggest what items around us, that we see, which we know, we think, have something they all have in common! All of them are composed of two or more members, without any of them, they do not exist. Yet such elements are mutually independent in each of them orthogonal. For buoyancy force on the submerged body - is the volume of the submerged body and the specific gravity of water; for the electric current through the conductor - the voltage at its ends, and its conductivity; for aircraft - its engine and airframe; control systems - the control forces and communication; control forces - forces personnel management and controls forces; for the human genetic code - its form and content; for the government - a team of its employees and its management tools (software and technical), etc ..

Analysis of the essence of such a representation of objects allowed to formulate a rule I (tectological function):

If an object can be fully and directly determined (described, expressed) by some mutually independent (orthogonal) elements (properties, characteristics), so that an increase in the potential (value) of each of which leads to increase in potential of the object, while approaching zero results in its lack of sense, loss of mission, turns the potential of the object to zero, then potential of the object is equal to multiplication of potentials of these elements:

$$U_0 = \prod_{i=1}^n U_i, \quad (1)$$

Where  $n$  is the number of orthogonal elements of potential of the object,  $U_i$  is potential of  $i$ -th element of the structure of potential of the object. If the elements are defined by other elements, and those in turn by some others, and so on for several times, and all they meet the rule I, then the potential ( $U_0$ ) of such object is equal to multiplication of potentials of elements ( $U_{k,i}$ ) that terminate disclosure of the structure of the potential of the object:

$$U_0 = \prod_{i=1}^{n_{y,k}} U_{k,i}, \quad (2)$$

Where  $n_{y,k}$  is the number of elements terminating disclosure of all branches of the structure of the potential of the object  $U_0$  and meeting requirements of the rule I,  $U_{k,i}$  is potential of  $i$ -th terminating element.

Potential dimension dimensional object can be represented as a rectangular area, the sides of which are equivalent to the form and content of the subject, or the number and quality of the subject, or body mass and speed up its movement, if the subject is a force acting on it. The potential of the three-dimensional object dimension is represented as the volume of the box. The potential of a more complex object can be represented as a kind of volume in a Hilbert space, the size of each edge of which corresponds to a specific subject characteristic.

Number of subject characteristics of potential types does not exceed the number included in the table of physical quantities in the SI system of units of information and dimensionless (shares, units). Some characteristics may be included in the subject building dimension repeatedly.

Rule I can be specified for the case when the subject of the requirement of orthogonality building elements is not performed. Then, in the expressions 1 and 2, you must enter an additional factor:

$$\prod_{j=1}^{m_c} f_j, \quad (3)$$

Where  $m_c$  - the number of coefficients of the interdependence of all pairs of elements  $f_j$  of all levels of the subject building structure. The coefficients  $f_j$  can take values from zero to one (in the absence of  $f_j$  interdependence tends to unity, with the full interdependence - to zero). Expression (3) carries the interdependent elements in their orthogonal projections.

It is noteworthy that there are objects which are potential elements of the will of their creators can be either orthogonal or interdependent. An example of the items in this series advocates the potential of the government, on the first level, which structures may be potentials of the legislature, executive, judiciary and the media. Naturally, with increasing interdependence of these elements the potential capacity of public authorities falling.

Thus, the rule I establishes a previously unknown quantitative relation between the potentials of the subject, its form and content, as well as some other philosophical categories, contributes to the identification of the essence of the unity of the world, Tectology, because it allows to use a single method of calculating the potential objects of various nature and complexity, a single method for the disclosure of their structures.

Rule II: If an object can be fully and directly determined (described, characterized) by several equidimensional elements (properties, characteristics) ( $U_k$ ), the increase in the potential (value) of each of which leads to the increase in potential of the object, and approaching to zero, while decreasing potential of the object, does not change its sense, mission, and does not turn the potential of the object to zero, then the potential ( $U_0$ ) of such object is equal to the sum of potentials of all of its elements:

$$U_0 = \sum_{k=1}^m U_k, \quad (4)$$

Where  $m$  is the number of elements that meet the requirements of rule II.

Thus, the rule I establishes a previously unknown quantitative relation between potentials of the object, its form and content, linking it with some other philosophical categories; the rule contributes to identification of the essence of unity of the world, to tectology, because it allows to use a single method of calculating potentials of objects of various nature and complexity, a single method of disclosure of their structures in a Hilbert space.

Versatility of tectological function is seen as its important feature. It allows to reveal in detail the structure of inanimate objects, of nature and man, the structure of the most complicated ergatic systems, both long-established and expected to be created in future, it allows to reveal the quantitative relationships between all the system's components. Thus, it helps find the unity of the world, its organization, development, and life. It contributes to the general theory of systems and structures of objects.

Disclosed by the rules I and II of the subject building structure has the form shown in Figure 1. On the ground level of the structure is the potential of the subject under consideration. In the next (first) level are potential elements, immediately and directly related to the potential "vertical" links the subject. On the second level there are potential elements, immediately and directly related to "vertical" relations with the potentials of the corresponding elements of the first level. Likewise disclosed subject building structure from Level 2 to the 3rd from the 3rd to the 4th, and so on. The set of potential elements of "vertical" relationships, forms a branch structure. As a rule, some branches of the subject building structure come to an end earlier than others. The structure of some objects may be composed of both elements that meet the requirements of the rules I, and rules II. Elements that meet the requirements of Rule I, and the interdependence of factors proposed in the diagram represent the boxes, and the elements that meet the requirements of Regulation II - ovals.

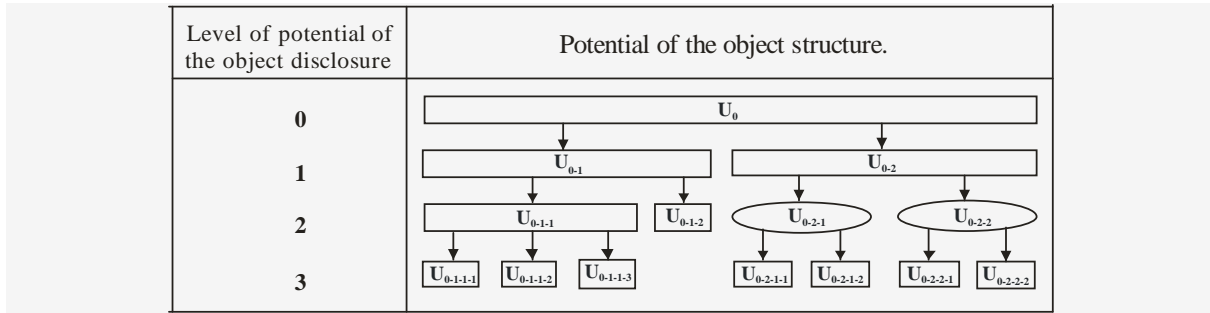


Fig. 1. Structure of the potential of an object

Revealing the subject building structure in accordance with the proposed rules is not always easy to identify all of its elements. Such work always requires a good knowledge of the subject. Specialists, probably corresponding to reference potential structures can be designed relatively simple and commonly used items. Substantial assistance in discovering the subject building structure may have a use corresponding to the above rules the categories of philosophy (quantity and quality, space and time, form and content, the general and the particular, necessity and accident, etc.), The subject characteristics of geometry (height, width, depth ), physical (force, weight, power, inductance, capacitance, conductance, etc.) and structural (and people agents, hardware and software, etc.). Given the rules fully comply with many well-known laws of physics, geometry theorem (see. Fig. 2). However, there are many things, the relationship between the potentials and capacities which their elements are of some interest for their creators and owners, is not disclosed. Such items may include, for example, the potentials of the industrial enterprises, agricultural farms, workstation, worker, works of art, poetic creations, residential buildings, a computer program, magazine, motor vehicles, aircraft, tanks, aircraft carriers, a control system, Gazprom , the state Duma, government, etc. etc..

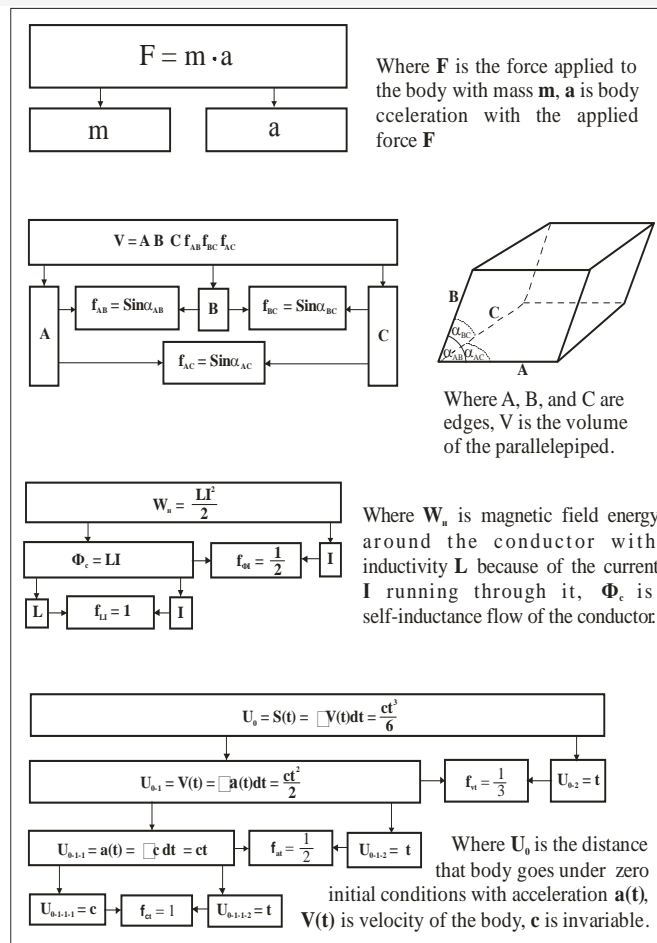


Fig. 2. Expressions structure of some widely-known laws of physics and geometric theorems disclosed by the rules of tectological function.

As an example, Fig. 3 shows a fragment of a variant of the structure of the capacity of the production plant. Fully disclosed this structure to determine the quantitative relations employee potential and specific production tools, as well as requirements to the potential of officials at various levels of enterprise management system. An important feature of tectological feature is its versatility. It allows to reveal detail the structure of inanimate objects, nature and man, the most complicated ergonomics systems, long-established and expected to create in the future, to reveal the quantitative relationship of their components. Thus, it helps to find the unity of the world, its organization, and the development of life. It makes a contribution to the general theory of systems and structures of objects. Rules of disclosure items structures I and II proposed as a system of common principles and rules according to which it would be possible to build a system-structural study of objects of different nature and complexity. According to the Encyclopaedia M.: Gardariki. Edited by AA Ivin. 2004. [4] Synergy is the doctrine of the cooperation («die Lehre von Zusammenirken») elements within complex systems, in which there are new macroscopic properties of these systems. Although the system may consist of a large number of elements having a large number of degrees of freedom, its macroscopic behavior can be described by a small number of significant events (of the order parameters), or even only a single mode. The order parameters determine the behavior of all the elements of the system (the subordination principle). In other words, the principle of subordination is monstrous data compression instead to characterize the system through a large number of its individual components and their behavior, is enough to describe it by means of the order parameters. Here we see the phenomenon of circular causality: the order parameters dictate the behavior of the other elements of the system, which, in turn, impact on back order parameters and define them. According Haken, Synergetics refers to the direction of universalism, which occupies an intermediate position between reductionism and holism. Synergy does not reduce the behavior of the system or to its behavior at the microscopic level (reductionism), nor to its macroscopic behavior (holism), but rather trying to understand how to install and operate the connection between these two levels. This can be due to her notion of order parameters and the principle of subordination. Tectological function (analytic expression of the order parameter) and disclosed by its rules analyzed the subject building structure (holism) element to the final disclosure of the subject building structure (reductionism) strikingly consistent with the essence of synergy. Disclosed via tectological structure and dimension of the potential function of different subjects like human finger prints figures differ originality. By comparison the potential close to destination objects must be approached very carefully, because all the details and features of the object are reflected in its structure. The structures of the same subject matter disclosed for various purposes, will differ from each other.

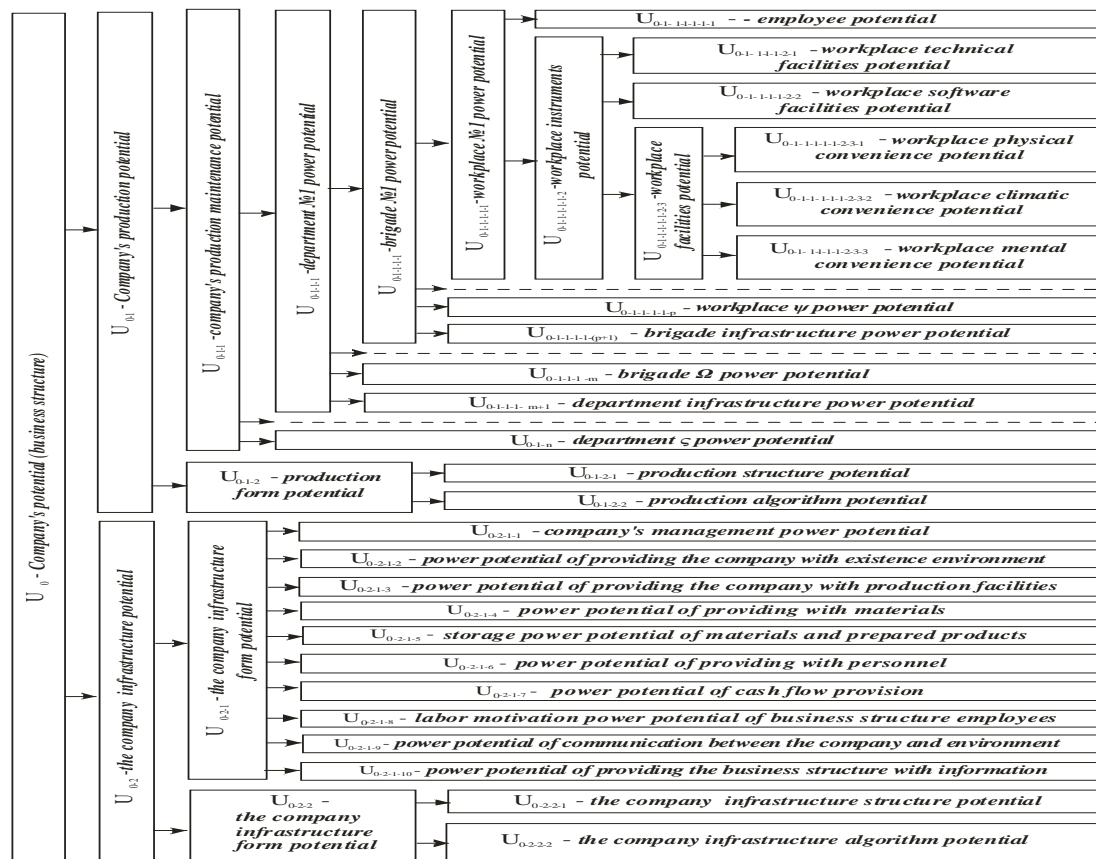


Fig. 3. Fragment of the company's potential structure variant.

Management potential can be expressed as the product of a potential control power and communication power, and can, as a work form management capabilities and its content, but you can select other options for presenting the potential of this subject. To determine the ratio of resources allocated to developers control forces and binding forces, apparently, is the minimum required to disclose fully the structure and the relationship of these forces ..

An important consequence of tectological function is usually the best use of  $P$ , providing an object life cycle. These funds are distributed between the elements of the first level of its structure. Funds inherited element of the first level, are distributed among its defining elements of the second level and so on up to the elements, the final disclosure of the subject building structure.

Obviously, the potential of the  $i$ -th element building structure subject  $U_i = k_i \cdot P_i$ , where  $k_i$  - coefficient of proportionality between the potential of the  $i$ -th member and means (resources) of  $P_i$ , spent on its creation (acquisition), development, operation and maintenance of recycling.

consider the object to determine the optimal size of the resources of  $P_i$ , which has only two elements, corresponding to the rule I. It is obvious that the potential of the  $i$ -th element of the subject building structure  $P_i$ , where  $k_i$  - coefficient of proportionality between the potential of the  $i$ -th member and means (resources) of  $P_i$ , spent on its creation (acquisition), development, operation and maintenance of recycling.

Consider the object to determine the optimal size of the resources of  $P_i$ , which has only two elements, corresponding to the rule I.

Its potential  $U_o = U_1 \cdot U_2 = k_1 \cdot P_1 \cdot k_2 \cdot P_2$ , and the funds allocated for the maintenance of the subject of the life cycle, limited to the value of  $P$ .

The potential of the subject takes the maximum possible value when  $dU_o / dP_i = 0$  and  $k_i$  coefficients do not depend on the size of the funds allocated elements of the subject, when these funds are close to the optimum value. The latter condition is easily achieved when the analysis of objects, the need for elements that do not reach a value commensurate with the quantities offered by the market.

$$\text{Given that, } \sum_{i=1}^{n_{y.k.}} P_{k.i} = P, \quad U_o = k_1 \cdot P_1 \cdot k_2 \cdot (P - P_1) = k_1 \cdot k_2 (P \cdot P_1 - P_1^2).$$

$$dU_o / dP_i = k_1 \cdot k_2 \cdot P - k_1 \cdot k_2 \cdot 2 \cdot P_1 = 0, \quad k_1 \cdot k_2 \cdot P = k_1 \cdot k_2 \cdot 2 \cdot P_1.$$

Thus  $P_{1.opt.}$  and  $P_{2.opt.} = P/2$ . Similar results are obtained when more  $n_{u.k.}$ , ie optimal  $P_{u.k.i} = \text{the } P / n_{u.k.}$ . In view of this and the above allocation procedure (resources) from the higher-level element to elements of the lower level of the subject building structure corresponding to the rule I, the conditions of the optimal allocation of resources (resources) are as follows: rule III: If  $k_i$  coefficients do not depend on the amount of resources allocated for the object's elements, when these resources are close to their optimum amount, then the optimal share of resources (funds), allocated for the elements, that terminate the complete disclosure of all branches of the structure of the potential of the object, results from the equitable distribution of all funds (resources)  $P$  among these terminating elements. The optimal share of resources allocated for an element of an intermediate level of the structure is determined as the sum of optimal shares of resources for all elements resulting directly from the next level of development of the structure of the potential of the object.

It is obvious that the potential subject matter, whose structure satisfies Rule I, takes the maximum possible value  $U_{o.maks.}$ , Where each element of each level of its building structure gets  $R_{i.opt.}$ , That is, a value funds, which is obtained as a result of this the optimal allocation of funds  $P$ . any deviation from the optimal allocation of resources or  $P$  leads to a decrease in the capacity of an object by its possible values, or require an increase in the amount of  $P$  to its capacity has reached the required value.

If some deviations occur from the optimal allocation of funds (resources) among the elements of the potential of the object identified by the rule I, the object's relative potential (ratio of the potential of the object to its potential when the optimal allocation of resources among all its elements takes place) is

$$U_{00.p.} = U_o / U_{o.maks.} = \prod_{i=1}^{n_{y.k.}} (1 + \Delta_i), \quad (5)$$

Where  $\Delta_i = (U_i - U_{i.onm.}) / U_{i.onm.} = (P_i - P_{i.onm.}) / P_{i.onm.}$ . It is therefore apparent that the sum of the deviations  $\Delta_i$  equals zero.

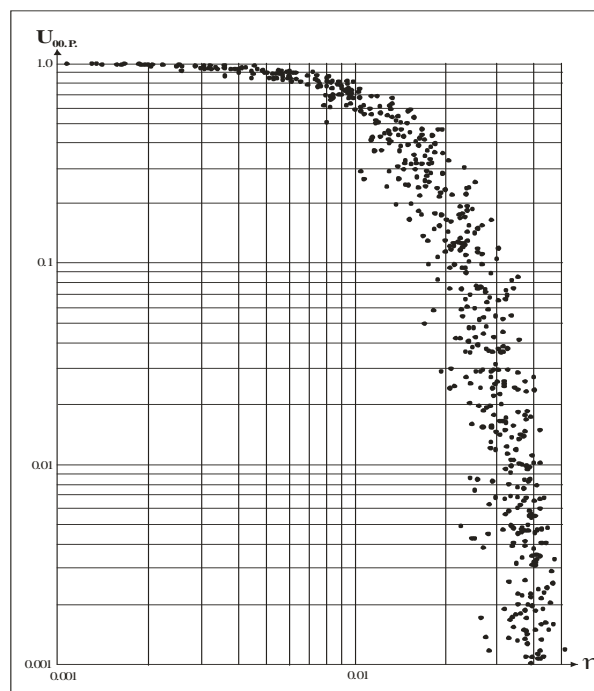
From (5) it follows that the relative capacity of the object, the structure of which corresponds to the rule I, is independent of the coefficients  $k_i$  and  $f_j$  and therefore useful for the analysis of the impact that the deviations from the optimal allocation (resources) between its elements..

The relative potential  $U_{00.p.}$  Physical strength similar chain consisting of links with a strength equivalent to  $(1 + \Delta_i)$ . Means  $P_{k.i}$  equivalent weight of the chain link. The greater the variation in weight (thickness) of links, the lower the potential strength of the entire chain, the weakest link defined below efficient

use of limited resources that provide object lifecycle. It is necessary to note that the subject of the potential structures that differ by several levels of disclosure, elements, structures completion disclosure, other than its own account for the deviation from the optimal values, taking place at all levels of the intermediate structures of disclosure. As one weak link in the chain determines its strength, and the weakest one factor in terms tectological function determines the potential of the subject.

To assess the degree of influence of deviations from the optimal allocation of funds for capacity building of the cottage object structure was uncovered with the help of expression (5) the dependence  $U_{00.P.}$  by  $\eta$  - the expectation value of  $\Delta_i$  provided that all  $\Delta_i$  obey the normal distribution law (Figure 4.).

Its ordinate axis represents the values of the relative potential of the structure, on the horizontal axis - the expectation of the deviation from the optimal share of funds allocated to each respective element of the structure of the building structure. From this it follows that the value of the cottage building starts falling rapidly, if the expectation value of  $\Delta_i$  exceeds 0.02, and at 0.04 it has been declining for three orders of magnitude! For items other than the larger potential structures, the potential drop begins at a lower and more steeply  $\Delta_i$ . Versatility tectological function contributes to the identification of the essence of the world unity, to tectology in addressing the structural unity of the world and common mechanisms for the various phenomena in the art, where there is a need in the general theory that overcomes the boundaries of specialization and allowing to build systems, covering both people and computer equipment, and actuators. Rules of disclosure of non-traditional subject building structure allows carrying out calculations of its potential and the optimal allocation of resources among its characteristic elements on the criterion of maximum potential relationship subject to resources, ensuring its life cycle. Exceptionally strong dependence of the potentials of complex objects from minor deviations from the optimal allocation of resources between the characteristic elements of their structures (Fig. 4) strongly requires appropriate calculations to create a major complex systems and mathematical models, including large and important ergatic system as the national system management, international sustainability management system of life on earth. Deviations from the optimal allocation of resources between the characteristic elements of the subject building structure happen when the owner or the object created for one reason or another does not identify these elements, and therefore has no control over the value received by each of them means (resources) when their potentials are responsible different independent bodies (persons), where there is corruption, when there are delays in the distribution of compensation funds (resources) to take account of the changed conditions of production, the existence and utilization of the object, including the emergence of relevant new scientific and technological achievements. Allocation errors occur and as a result of the delay on the timely correction of the distribution for changes in the value of the product of elements of the life cycle, the various production components (personnel, energy, enterprise management, material and software production, maintenance, operation and disposal of manufactured products), logistics costs, supply and demand in the market of the mentioned elements, etc.



**Fig. 4.** Dependence between the cottage relative potential and the expected value of deviation from the resources optimal fraction

Subject building structure disclosed by the rules tectological function, and its corollaries are ready to act based on mathematical models of the object.

Given that in the theory of operations research, one of the main requirements is the "strength balance" in relation to various destructive factors, accidental or intentional nature, the use of the above article of the rules of the subject building structure disclosure helps to avoid mistakes in providing said uniform strength - equal strength elements of the subject structure, finishing, instead of starting its disclosure.

In contrast to the production functions considered economic science in the article rules allow the analysis of the efficiency of the production system to get away from the use of subjective values are assigned a relative importance index, elasticity, etc.

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