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Transport and Telecommunication Institute, Lomonosova 1, LV-1019, Riga, Latvia*

MECHANISMS OF FUNDAMENTAL CHANGES IN THE INTERVAL UNCERTAINTY REMOVAL PROCESS IN THE CONTEXT OF ORGANIZATIONAL STRUCTURE MANAGEMENT

¹ *Rostislav Kopitov*, ² *Roman Zaharov*

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia*

¹ *Ph.: +371 67100585. E-mail: rkopitov@tsi.lv*

² *Ph.: +371 29802853. E-mail: romanzaharovs.yahoo.com*

The methodology of a new approach in the field of organizational design is considered in this article. This approach is important as it focuses on tensions within an enterprise caused by the interaction of two important opposing tools of the organization: hierarchical structure and organic relations. The process of the interaction of these two tools is called the criterion function adjustment. The task of the hierarchical structure is to coordinate the activity of all elements in the company in order to achieve defined aims. The purpose of organic relations is to give adaptive features to the elements of the hierarchical structure which do not satisfy certain conditions. As a result of criterion function mechanism adjustment, the process of system self-organizing begins to take place. Criterion function adjustment occurs with the help of the estimation of reasonable fundamental changes and the acceptance, on the basis of the removal of interval, of the revealed organizational defects. An estimation of the loss interval value is calculated for upon organizational effect, using a transport enterprise as a concrete example. Thus, the interval uncertainty of fundamental transformation for the concrete company is removed.

Keywords: *acknowledgment, environment, principles, responsibility, losses, controllability, criteria, conditions*

The aim of the management of the organizational structure is to enable and maintain the steady functioning of the enterprise while acknowledging established parameters, and in the absence of data regarding principles and conditions of the behavior of participating parties. In order to reach this aim it is necessary to disclose this uncertainty by defining the intervals of unknown parameters by means of maximizing the various responses to the behavior principles of the environment of every participant in the organizational structure. The basis for such responses is the presence of a stimulus which reflects the preferences of participants, considering established relations and distributed responsibilities.

The presence of interval estimations produces a sufficient variety of scenarios, thereby helping the disclosure of uncertainty during the construction of the organization's structure. The hierarchical structure is accepted as the standard, with strictly fixed elements that characterize the knots of assumed reliability. Redistributing the reliability results in not only organizational changes, but also in losses of enterprise controllability. These losses are evaluated, taking into consideration the expenses and time spent on restoring the revealed losses. The classification of regenerative procedures in the context of value potential allows risk zones to be generated regarding the situation of management losses. Such zones act as the basis for the development of management error criteria systematization.

Configured criteria allow the enterprise to pass to a new qualitative level of acknowledgment. This is reached by rejecting the prevalent hypothesis of adapting to the external environment and instead focusing on collective recognition, judgment and the generalization of difficult situations. Thereby the conditions for continuous fundamental changes in predefined conditions are formed.

The configuration of described class conditions is investigated as a part of an operating multifunctional transport enterprise.

1. Methodological Problems Revealed in the Organizational Structure Designing Process

The organizational structure of the enterprise is formed to coordinate people's activities in order to achieve general defined purposes as a part of the processes of distributing power and delegating work. The distribution of power is influenced by features of technological processes and existing management procedures. Here, as a rule, a scalar power hierarchy occurs over technological networks. Irrespective of its subordination type, any organization has a hierarchical substructure in its formation. In addition, center

priorities, and also discrepancies between the purposes of the center and the executors are observed. Therefore it is likely that mechanical approaches to the construction of organizational structures are the most popular [1-7] rather than organic mechanisms [8-10]. The first case is characterized by the desire for innovations. However, in combination with the effects of an absence of historical restrictions and a belief in economic efficiency criteria, this can lead to a repetition of the same key ideas [12]. In the second case, there is a veiled adherence to hierarchical principles, represented by the organic consciousness mechanical vision view [13]. Over the last 160 years, in the study of management, there has been much debate over the exclusive position of centralization or decentralization in process of management [14, 15]. The context of fluctuation between two extreme measures makes producing a balanced optimum structure impossible, and can cause many practical difficulties in business operation.

Considering the highlighted circumstances, it is necessary to make two conclusions. First, in developing organizational structures, the organic vision should be united with mechanical approaches. Secondly, the interrelation between centralization and autonomy during the formation of an organizational structure should be a cyclical process, rather than conforming permanently with management trends.

Thus, the problem can be solved by generating organizational tools, acting in accordance with rules of strict hierarchy (the beginning of the mechanical approach), having the features of a viable system (an organic basis) and applying these within the frames of well-founded intervals (cyclic essence).

Strict hierarchy formation follows rules, allowing unnecessary operating links to be revealed at all structure levels. The reproduction of features in a viable system context is connected with the ability of the organizational system to reflect fundamental changes in the coordinated external and internal environment. The substantiation of intervals borders is based on the joint selection and use of two opposite terms, which in the various conditions allows the uncertainty and the prevalence of one of the possible scenarios to be removed.

1.1. Strict Mechanical Hierarchy Formation

The presence of a hierarchical structure starts with intentional efforts to form and improve the structure, connected with internal organization requirements, task distribution, and management rationalization (rather than an organic adaptation to external environmental conditions). The use of hierarchies in developing structures occurs when organic structure construction mechanisms cannot be used for two reasons. Firstly, the necessity for detailed task distribution according to the type of work is rejected, and secondly; the existing relations between managerial process participants are dictated not by the structure, but by the character of a problem being solved.

Existing approaches to organizational hierarchy formation problems are connected with the complexity of described object. Nevertheless, to understand the contextual background, it is necessary to highlight a number of works, which present a unified mathematical statement in the form of discrete optimization task [16-21]. However, in accordance with the mentioned works, the variety of possible hierarchies is so enormous even in the elementary cases, that an accepted definition of an optimal hierarchy does not exist. In relation to all the aforementioned, it is necessary to identify six restrictions.

- (1) all structure elements operate various groups of executors;
- (2) only one element is not operated by others. All other elements are subordinated by this element;
- (3) among the elements directly subordinated by the aforementioned one element, none operates any other;
- (4) the structure's elements characterize the links of distributed responsibility;
- (5) responsibility distribution done on the basis of considering unique skills can lead to the collapse of the final structure;
- (6) the linking of structure elements is based on a values system, expressing the special intention of the enterprise regarding its singular problems and the definition of its aims realization trajectory in a certain time period.

The acceptance of these listed rules is not intended to reduce the set of hierarchies, where an optimal structure exists, but to strengthen the rules of organizational structure construction. Within the frames of these rules, the possible actions and results of subordinates' activities are limited.

1.2. Fundamental Changes in Coordinated Environment

The organizational structure's ability to perform an adaptive – adapting function allows the organization to be judged as containing a viable system feature. This makes it possible to speak about self-organizing [23, 24], or fundamental changes [25-27]. In both cases the management power distribution has an organic nature and causes the non-observance of strict hierarchy rules.

At the same time, flexible and adaptive organic mechanisms allow the organization to easily change its form, to adapt to new conditions, to be integrated organically into a management system, and also to function in different conditions, representing the set of organizational structure and external environment elements. Readiness for fundamental changes is developed by being adaptive to the circumstances of consciousness formation by means of planning at the discovery level [28], which consists in making assumptions of the forecast error opportunity. This makes it possible to receive the information during the process that not only allows management to be looked at from another perspective, but also provides opportunities to change the plans. As a result, the basis for manoeuvring in a variety of scenarios is formed by means of continuous communications. Thus the investigation and formation of a local organization is realised according to its own circumstances and requirements. Moreover, it is performed with certain restrictions due to the laws of organizational structure. Such restrictions define what an enterprise is, and is not able to do. In a situation in which the laws of organizational structure differ from the proposed changed laws, existing organizational restrictions cause certain losses for an enterprise.

When faced with coming changes, the success of an organizational structure can be seen in its understanding and use of the new laws., accepted in the innovative offer. The basis of this understanding is five principles which can be applied or adapted for any situation in practice.

- (1) to respond to the principle stating that enterprise resources depend on consumers and investors;
- (2) to accept the principle that small markets cannot provide profitable growth;
- (3) to reproduce principle opposing the notion that it is impossible to analyse a nonexistant market
- (4) to adapt the principle of the possibility of an organization becoming a hindrance to its own development;
- (5) to check the principle of technological maintenance discrepancy to market requirements.

Generalizing the listed notions, the secret of an organization oriented to fundamental changes consists in the creation of comfortable conditions, which allow changes to occur in circumstances where the organization keeps considerable control. Comfort is provided at the expense of special consciousness formation, promoting the organization to continuously improve its preliminary readiness to operate in unique directions.

1.3. Hierarchically Connected Binary Construction of Opposite Terms for Interval Uncertainty Removal

An organization’s readiness for fundamental changes is developed during research into its unique possibilities and in consideration of the actions which are capable of leading an organizational to its destruction. Boundary scenarios of organization’s development are necessary to generalize information regarding business conditions, and after considering that it is possible for the behavior of participating parties to pass to a new level of knowledge. Such a transition follows from an organization being hit in a certain balanced condition, which is defined during well-founded “maneuvering” among a set of known scenarios. It is necessary to allocate two extreme balance conditions: one which guarantees as much as possible, and the best balance conditions.[29]. In the first case the worst environment conditions (the pessimistic condition), and in the second – the best (the optimistic condition) is realized. Thus the best chosen action, which is carried out by a certain subject, provides a maximum of its criterion function, and the worst provides a minimum. The choice of the subject is affected by factors of objective uncertainty, concerning incomplete acknowledgement of conditions parameters. We will consider the influences of conditions, entering the uncertain factor θ belonging to variety Ω . In this case the criterion function of the subject depends on a value, which has an uncertain factor. To describe decision-making by the subject in conditions of uncertainty, the determinism hypothesis is entered, in which the subject making the decision aspires to eliminate uncertainty and to make decisions in the full acknowledgement conditions. For this purpose the subject should pass from the criterion function depending on uncertain factors to the criterion function depending on parameters which he can choose itself.

Derrida's modified approach is used for selection of the key parameters influencing criterion function of the subject, choosing the preferable variant of organizational structure [30]. Seven principles are offered on its basis, combining socially-valuable beliefs, which are designed on the basis of objectively rather than the possibility of solving conceptual contrasts:

- (1) to accept the principle of “peaceful existence” of two opposite terms (exclusive and isolated);
- (2) to accept the principle, which means that one of the opposite terms, having the position of superiority, temporarily operates the other;

(3) to apprehend the principle of “the obligatory postponed return” of the isolated term to the privileged position;

(4) to reproduce the principle which opposes the principle of the binary-hierarchical representation of contrasts, based on the differentiation of opposite terms to connect terms, and then to operate the distribution of the united connection in a continuous cycle of fundamental changes;

(5) to comprehend the principle of word root analysis, characterizing chosen terms in a full cycle of their fundamental changes;

(6) to adapt the principle of possible preference of one of the terms in its obligatory comparison to the opposite term;

(7) to check the principle of one of the terms' preference for change because of changes in traditions or ethical standards.

Therefore, hierarchically connected binary design of the opposite terms is used, as the key parameter characterizing the organizational structure. Its interrelations are represented by an operational definition, from which it proceeds, that both terms supplement each other so closely that neither of them can exist without the other.

Use of the offered design for the elimination of objective uncertainty allows a definition of the interval of uncertain θ parameter values, whose real values will be between the optimistic and pessimistic estimations. As the pessimism and optimism conditions set the certain interval that the uncertain parameter belongs to, the existing uncertainty is interval. The interval uncertainty removal problem can be solved by the presence of the full acknowledgement, which exists in the hierarchically connected binary construction of opposite terms.

2. System Function Implementation as Organizational Structure Regulator

Investigation of the revealed problem from the point of view of readiness for fundamental changes is based on the requirements of the combination of constancy and flexibility. If a well-founded offer of a change presents itself, the enterprise's authorities will have the desire to implement it. In such situations new possibilities should not replace or even dilute the level of the management decision making process. Anew raised processes should proceed considering full apprehending of developed at the enterprise management.

2.1. System Function Customization Rule for Fundamental Change Realization

The existing organizational structures of the enterprises should not change under the influence of external factors. Changes should concern organizational methods, which are involved in the course of a management structure's reaction to external influences. The contradiction which arises, connected with the simultaneous support of the constancy and flexibility of organizational structure, is eliminated by means of management system function coordination with changes in the degree of globalism degree (see Fig. 1).

This degree shows the frameworks of reasonable involvement of the enterprise in a certain standard-operated space of cooperating participants with their communications and relations. The invariance condition is provided by a strict structure construction within the limits of the established relations, and its flexibility is provided by the soft organization, formed as a part of prospective communications.

As a consequence, a new rule is formulated, characterizing the implementation of system function adjustment for change, formulated in terms of setting the functioning borders (according to the complexity of the developed relations in standard-operated space). The rule consists of the physical (performance of an isomorphism condition at relations level) and logical (performance of a homomorphism condition at communications level) independence of the organizational structure. In the present treatment, management system function describes those reformative actions, which are defined by involving the localization process of the level of functioning borders, depending on changes in the degree of globalism in the process facing the organization. The locality of functioning borders is characterized by the responsibility structuring scale, which depends on what exactly is opened by the system function: normal functioning, failures or losses, crisis or accident. The task globalism degree is defined by scale of structuring of management relations, established to define the behavioral characteristics of the participating parties.

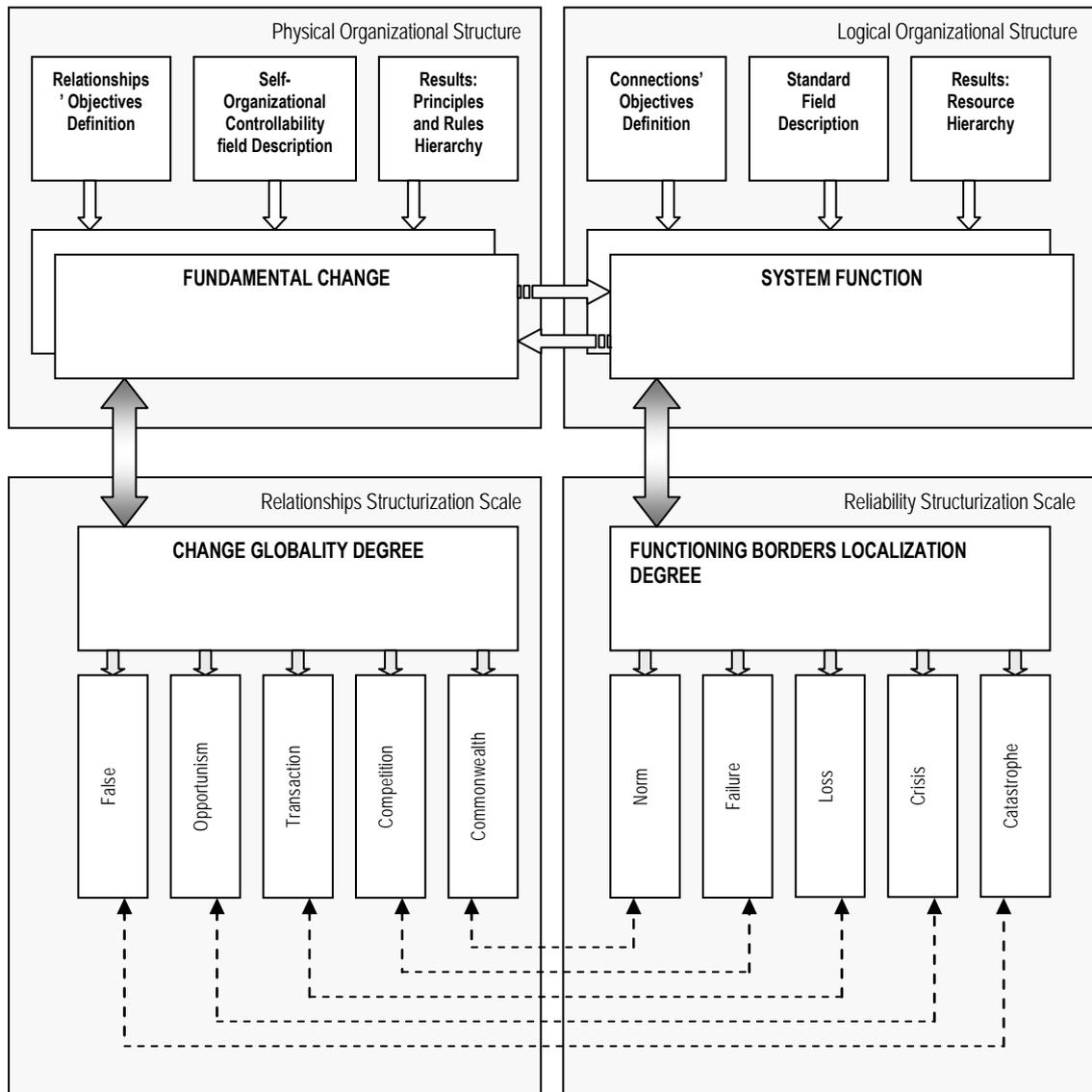


Figure 1. System Function Customization Structural Construction for Fundamental Change Realization

2.2. Regulation of Organizational Structure

Consideration of the environment of participants' behavioral characteristics allows the establishment of a hierarchical responsibility structure (mechanical construction), which, depending on the chosen functioning scenario, will change at the organization level (organic adaptation). Thus, the separate considerations of the structure and the organization take place, which when combined comprise the enterprise's organizational structure.

The relative distribution of responsibility measures (personified, consumer, enterprise and social), synchronized with the well-founded scenario provides harmonization of the relations built between participants interested in such a distribution. A certain virtual social space is allocated as a result (“environment”), for which the system of a positive and negative stimulus is set by the recognition of popular principles, allowing to adjust the system function to be adjusted, defining the set direction for actions of the environment of participants. The finding of system function during management mechanisms transformation to the standard principles represents a required regulator of organizational structure (see Fig. 2).

The described tool is used for to estimate participant’s behavior at the established so-called “relationship contracts” level, on which basis rules of the observance of obligations, connected with social responsibility, are checked. It is necessary to highlight that in the present research “the responsibility” category is considered as the realized necessity for operating for the blessing of the standard norms. Consequently,, the bases for the development of concrete behavior rules are formed. Thus the

and which are intended for the conduct of coordinated actions. Having such an approach, the members of the created environment form a class of interested participants. The present posture of affairs, corresponding with the equilibrium condition and also forming the optimism condition, will be considered as the boundary “Creation” scenario. The normal functioning of the enterprise is characteristic in the described scenario, when the strict structure completely corresponds with the soft organization, operating in conditions of mutual benefit. In practice it is impossible to provide such conformity, which as a result causes not only deviation from the hierarchy, but also a loss of controllability.

3. Interval Uncertainty Removal

In relation to the 'Creation' scenario, the 'Destruction' scenario is the opposite. For the given scenario it is necessary to define actions that lead to the destruction of an organizational structure. In Fig. 1 such actions, characterizing the accident condition (for example, because of the misinformation of one participant), are caused by a connection with organizational defects forces, such as: the incorrect distribution of responsibility at the level of relationship contracts or the inexact synchronisation of management mechanisms (see also Fig. 2). Revealing the real reason for the defect is achieved not by looking at the facts of the presence of catastrophic preconditions, but is proved by quantitative acknowledgement of controllability losses at the organizational structure’s destruction. Value is used as a required measure of controllability loss, reflecting the enterprise’s adaptability potential, spent on restoring the organizational structure's losses. The value amount, commensurable with the enclosed means of organizational defect elimination, characterizes the size of the controllability loss, caused by the compelled deviation of the actual organization from the planned structure. The value amount of the final organizational structure destruction (the first boundary “Destruction” scenario) is equal to the amount of value of normal functioning PV_{term} (the second boundary “Creation” scenario). There is a value distribution in $[PV_{term}; 0]$ interval, characterizing the set of possible development scenarios of the enterprise, among which there is a degree of localization of functioning borders. The revealed borders allow the business information of environment to be generalized and used for transition to a new acknowledgement level.

The value calculation PV_{term} is performed, measuring non-material actives, considering the operating enterprise model [31]. The received value corresponds with the valuable resources value from the point of view of their restoration and replacement [32].

The defect scales research information is shown in Table 1, the defects are distributed according to the degree of localization of functioning borders.

Table 1. Valuable Resources and Acquisitions Restoration Expenses Comparison as a Part of non-material Actives

Scenario	Creation	Maneuvering between boundary scenarios			Destruction
Organizational Structure's Defect Type	Standard	Failure	Loss	Crisis	Accident
Risk Zone	Absent	Allowed Risk Zone	Light Crisis Zone	Critical Risk Zone	Catastrophic Risk Zone
Organizational Structure's Destruction Feature	Standard Change	Suppliers' Network Recovery	Customers' base Recovery	Intellectual Capital Recovery	Reputation Recovery
Time, spent on Recovery, Years [32]	3	4	6	10	14

A further comparison of the cumulative key competence components of value with points generated according to the basic principles [31] of Denning's points [33] is made Further the value’s components of cumulative key competence comparison with the generated on Deming’s point’s [33] basis principles [31] is taking place.

Table 2. Key Competence Commensuration through Deming’s Points Distribution

Key Competence	General Moral Values and Norms	Skills and not formalized Knowledge	Primary Processes and Management Processes	Technology and formalized Knowledge
Deming's Point Number	12, 13, 14	9, 10, 11	1, 2, 6, 7, 8	3, 4, 5
Key Competence Share	21.4%	21.4%	35.7%	21.4%

The contribution of each component to the total value of non-material Actives is defined as a result. The intervals for each type of organizational structure’s defects (see Table 3) are established on the basis of received information.

Table 3. Valuable Resources and Acquisitions Restoration Expenses Comparison, In addition, Key Competence as Part of non-material Actives

Organizational Structure’s Defect Type	Standard	Failure	Loss	Crisis	Accident
Amount of Controllability Measurement Loss, Value	Interval 1	Interval 2	Interval 3	Interval 4	Interval 5

It is possible to remove the interval uncertainty concerning each fundamental change by commensuring the fundamental change value increase with the measure of the amount of loss of controllability.

4. Approbation of the Approach regarding the Example of the Transport Enterprise

The efficiency of the offered approach is approved using the example of a multifunctional transport enterprise. The enterprise is engaged with passenger transportation on local and international routes, and has own repair base.

The authorities have changed its management style, implementing management representation changes, rearranging settled priorities concerning globalism and locality in favor of the latter. The reorganization process involved revealing some organizational defects, their neutralization and the formulation of measures following from the results of a fundamental examination of the enterprise’s organizational structure. An estimated value of the enterprise’s activities has been fulfilled during all described events.

In Table 4 the results of the estimation of conditions of two enterprise development stages are listed.

Table 4. Transport Enterprise’s Controllability Conditions Evaluation

Indicators	Stage 1 (Management Style Change)	Stage 2 (Defect Elimination)
1. Non-material Actives Value, Euro	532942	882113

Besides, each component's contribution to total value of non-material actives (see Fig. 3) is defined. In addition, the intervals for defect type are revealed, the elimination of which occurs during fundamental change (see Table 5).

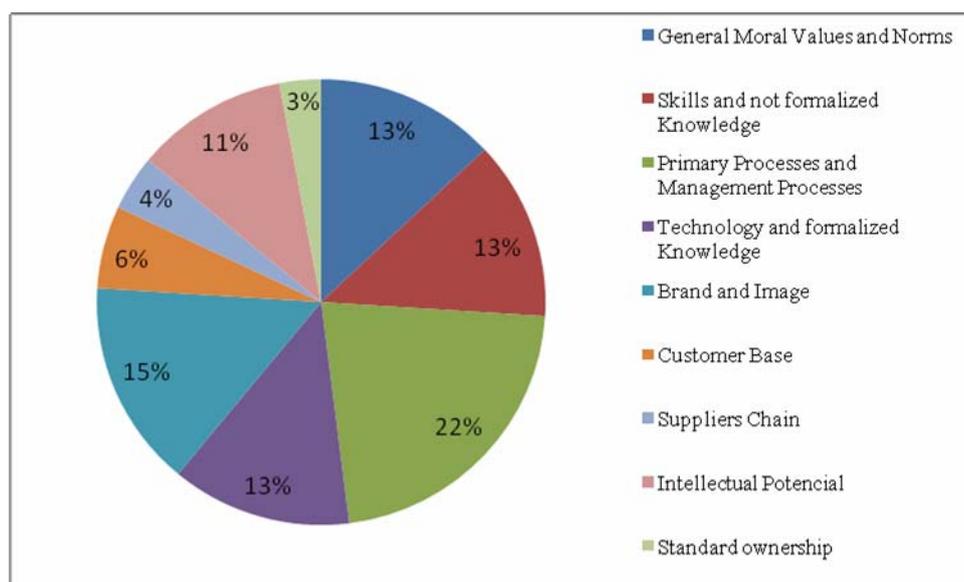


Figure 2. Regulation of Non-material Actives’ Components

Table 5. Transport Enterprise’s Controllability Conditions Evaluation

Organizational Structure’s Defect Type	Standard	Failure	Loss	Crisis	Accident
Bottom Interval Border, Euro	1	17254	40258	74766	315219
Upper Interval Border, Euro	17254	40258	74766	315219	532942
Loss Share, %	3%	8%	14%	59%	100%

A 65% value increase, caused by the elimination of revealed organizational defects of non-system origin is characteristic of the second stage (see Table. 6).

Table 6. Organizational Defects of not system Origin Characteristics

Form of Organizational Pathology	Organizational defect Type Measurement (Value Loss, Euro)	Interval	Organizational Structure’s Defect Type
1. Imperfect CRM program	126154	4	Crisis
2. Short-term oriented relationships with suppliers	24376	2	Failure
3. Ineffective management style	82686	4	Crisis
4. Low managers’ qualifications	66896	3	Losses
5. Stable process interference	49060	3	Losses

The defect type is defined, using the fundamental change value measurement, connected with the elimination of organizational defects, and considering possible consequences. This testifies to the elimination of uncertainty concerning the search for organizational structure’s defects.

5. Conclusion

The interval uncertainty estimation implementing the fundamental changes in organizational activity is the key point in understanding the efficiency of structural reforms. Without this tool it is impossible to reveal losses generated by an organizational structure’s defects. A manager’s understanding of the cost of reform may stop him from intervening in a stable process and force him to be involved in necessary changes. The removal of interval uncertainty gives an impulse to the process of fundamental changes within described frames of organizational designing approach, if there is an economic sense. The considered approach describes a balanced system, in which the responsibility system completely corresponds to the system of relations – as inaccessible (in dynamics). Changing the system of relations makes it is possible to change the system of responsibility, that in turn will change system function. The result of these changes in a kind of probable effect and in expenses, which have caused functional changes, can be estimated by means of interval uncertainty removal.

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