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FEATURE OF THE METHODOLOGY OF FULL-SCALE SYSTEM STATE ESTIMATION

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Abstract

The present study is devoted to a comprehensive analysis of valuation technologies adapted to the specific conditions of the external environment. New scales of business require the introduction of fundamentally new assessment approaches. Therefore, the assessment toolkit should be built on a system-forming basis, which enables the organisation to find timely solutions for the formation of effective development scenarios. The factor of timeliness is reflected in the acceleration of the implementation process, and contributes to cost savings on system maintenance. The emergence of these benefits is caused by the transition to a methodological approach, which allowed to fundamentally change the position of improving the assessment tools

Keywords: efficiency, reproducibility, route, weak link, assets, potential, growth

1 Introduction

The systems for assessing the state of an organisation, despite the existence of a developed theory and a high degree of algorithms, in practice produce low-quality results. There is an opinion among enterprise analysts that non-financial decisions are made on the basis of financial indicators. In addition, there is a huge number of errors in the systems. Taking into account the above-mentioned circumstances, it is necessary to dwell on the content of the evaluation device. Such a device is developed according to the System Engineering approach (S_Eng). The basis of the approach is the condition that in the course of system modifications the emergent property should be ensured, reduced to the fact that all elements work for a single purpose. In this case, System Thinking technology is used as a technology for selecting proposals for system improvement. The basis for selection is the forces that destroy the organisation. There are five such forces, in Figure 1 they form the foundation of the evaluation device.

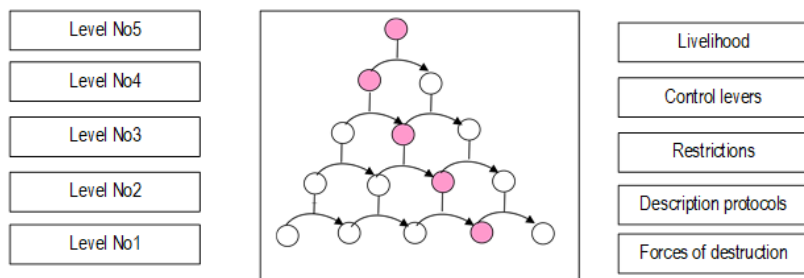


Figure 1. Evaluation device in the context of System Engineering approach & System Thinking technology

Knowing the nature of the forces destroying the organisation, we move on to the next level, called 'Description Protocols'. The action of the forces of influence grows in the direction indicated by the arrows. At the second level, an algorithm is developed to get out of the situation according to the set constraint (see Level 3) and the chosen development scenario (see Level 4). Thus, the proof of correctness of observance of the emergent property (Level 5. Life activity) is provided. Fig.1 shows an example of a route interpreting the exit from an unstable state. The route is labelled by four transitions performed between five shaded nodes. The content of the route is revealed by utilising the information included in Table 1.

Table 1

Characteristics of a traditional assessment device

Level	Title	Number of states	State names	Level content
Level No 1	Forces of Destruction	5	{Fighting, Tradition, Economics, Facts, History}	Break the bonds of an organisation
Level No 2	Description Protocols	4	{Biosurvival, Administrative, Conflict, Algorithmic}	Corrective mechanisms to get out of an unsustainable state
Level No 3	Limitations	3	{Capital Growth Rate, Sales Growth Rate, Profit Growth Rate}	Golden rule of economics
Level No 4	Control Levers	2	{Reclamation, Efficiency}	Observing the emergent property
Level No 5	Life Activities	1	{Production}	Performance in normality

The present device is effective in application when suggestions for improvement come from the responsible persons in charge of a specific production area. The main condition for modifications was the concept of 'Reclamation'. The developers of the system coped with the flow of complaints. In addition, among the collected notifications it was not difficult to identify mutually exclusive proposals, which negatively affected the efficiency of the evaluation system.

Confidence in the use of the traditional evaluation device, combining the functions of the System Engineering approach & System Thinking technology, was lost after the development of software tools to automatically incorporate innovative solutions through the processing of commoditised claims. In most of the cases, the process of automating customer claim fulfilment has taken place.

Replacing complaint notifications with applications that disclose user dissatisfaction led to the Scrum mechanism becoming the main one in the selection process. Decisions on innovative proposals, made with the active participation of a large number of people, turned the focus of complaints monitoring in the opposite direction. In addition, during adoption, groups were formed to protect the interests of their departments. The actionable nature of private opinions contradicted the effectiveness of the system. Suggestions for change rarely contributed to the identification of growth scenarios for the organisation. Taken together, these contradictory facts were the basis for the formulation of the research problem: 'It is impossible to determine the growth potential of an organisation if there is no means of objectively selecting proposals for improvement'. Taking into account the formulation of the problem, it was necessary to change the system-forming approach. Engineering Systems methodology became the object of the study. The vector of the methodology orientated towards the separation of process norms from measurement measures. The subject of the study was the full-scale nature of the evaluation. The aim of the research is focused on the development of a procedure that ensures the measurement of the efficiency of the enterprise's activity in the conditions of identifying the links that cause the organisation to leave the mode of sustainable functioning". In accordance with the goal, four tasks should be consistently solved. Firstly, it is required to develop a new device for assessing the state of the organisation. Secondly, to determine the limitations of the organisation's efficiency assessment. Thirdly, the mechanism of selection and implementation of new proposals. Fourthly, to develop instructions for the application of the modified state estimation device in the long term.

Problem solving provides the organisation with a device that allows it to develop medium-term productive development scenarios that provide growth potential in the long term.

2 Two important prerequisites for the transition to a new evaluation system

Given these advantages, it is necessary to focus on two systemically important points. These are the two concepts included in the title of this study. These are full-scale and methodology. Their joint use prevented the possibility of transition.

First, a full-scope mechanism in the traditional sense is configured to measure a performance indicator detailed within a given system of evaluative norms. The means of detailing are spread over time intervals of different duration. As a result, events are identified whose hidden preconditions lead to the destruction of the organisation. In the absence of corrective measures to prevent the negative impact of the event, it is assigned the status of 'Reclamation'. All events with this status are transferred to the category of prospective offers. The interest in such proposals is caused by the approach of their careful selection. The so-called 'Backward Modernisation' strategy is used. The point is that countermeasures taken in relation to events that have grounds for destruction of the organisation, as a rule, make the greatest contribution to the development of the organisation. Their elaboration is carried out from the position of an investment project. As a result, the most effective ones form a package for innovations in the next version of the system. So, a special technique of innovations selection is used in the work.

Secondly, the existence of methodological provisions brings clarity to the process of achieving the final goal. In methodological terms, the combination of provisions in a single system represents an interpretation of route guidance with an extended duration. With a large number of propositions, including disruptive innovations, it is easier to evade reaching the final destination. Errors of algorithmic nature, take the system out of the steady state. The purpose of the methodology is to protect the system from errors. In this regard, according to the Engineering Systems requirements of the methodology, the main threat to the system occurs when there is no means of objectively selecting proposals. In other words, the main force of destruction is directed at the organisation of the system. Therefore, when moving to a new device, the number of first level nodes should be increased. A new node 'Methodology' is added to the five nodes discussed in the disclosure of the content of the traditional device. Its embedding will require the addition of one node each at the next level. As a result, the modified device contains 21

elements, 15 transitions, 15 arcs. At the same time, a new sixth level appears, which is considered as the ‘Final Destination’.

Figure 2 shows the interpretation of a modified device. Such a device combines the functions of Engineering Systems methodology & Sensemaking technology. The content of Engineering Systems is revealed on the first and fourth levels. The fourth introduces the main principle of Physical and Logical Independence (PLI) of the methodology. The content of Technology is covered in the second and fifth levels. With Sensemaking in mind, a new language is required – protocol maintenance in terms of the so-called ‘Metaphor’ language. It is required to develop a system of justified constraints, for which the metaphor ‘Independence’ is used. This ensures that the authenticity of the adopted performance measure is justified. The lifecycle is provided in the context of meaning production. The lifecycle ends if the meaning of the organisation is not discovered at the fifth level. In the language of systems, this means that in ‘No growth potential is found in the organisation’.

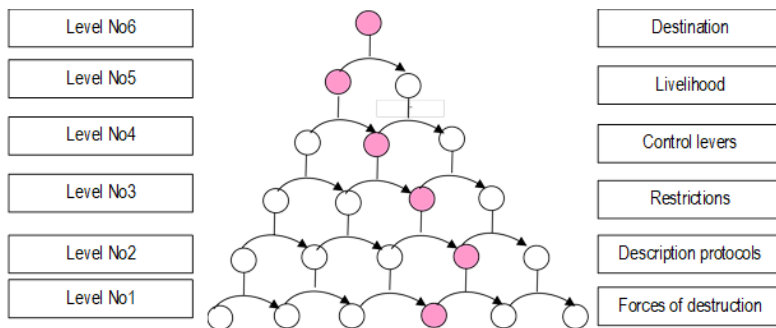


Figure 2. Evaluation device in the context of Engineering Systems methodology & Sensemaking technology

The two introduced concepts: full-scale and methodology, determined simultaneously the increase of the status and degree of responsibility of the developer. In the constructive aspect, the functions of the developer are expanded, as he has to take part in the selection of innovations. Content-wise, this conclusion is based on the identification of the following three conditions.

Firstly, the modified evaluation device must be constructed in the context of fulfilment of the Four Constraints condition formulated according to the Independence metaphor

Secondly, three levers of control are formed at the fourth level according to the PLI principle.

Thirdly, the life of the organisation ends in the absence of scenarios that unlock growth potential.

The presence of the conditions described above makes it possible to proceed to the description of the modified device.

3 Modified assessment device

Figure 1 shows an example of a route interpretation of an organisation's exit from an unstable state. The route is labelled with four transitions performed between five shaded nodes. The content of the route is revealed through the use of the information included in Table 1.

Table 2

Characterisation of the modified evaluation device

Level	Title	Number of states	State names	Level content
Level No 1	Forces of Destruction	6	{Fighting, Tradition, Economics, Facts, History, Methodology}	Break the organisation's ties
Level No 2	Description Protocols	5	{Bio-vital, Administrative, Conflict, Algorithmic, Metaphorical}	Corrective mechanisms to get out of an unsustainable state
Level No 3	Limitations	4	{Capital growth rate, Sales growth rate, Profit growth rate, Value growth rate}	Modified golden rule of economics
Level No 4	Control Levers	3	{Superposition, Emergent, Independent}	Adherence to the PLI principle
Level No 5	Life Activities	2	{Meaning, Production}	Finding the optimal structure
Level No 6	End Point	1	{Life}	Capacity growth achieved

Notifications of complaints, described in a proper form, are collected throughout the life cycle of the organisation. According to the regulations, the performance of the functioning is evaluated within a set timeframe. Unsustainability signals are generated at the third level (see Fig. 3). In this case, the signal is given: 'Parameters are not normal'. Further, the degree of corrective actions is determined. For this purpose, the states of the three levels, starting from the fourth level and up to the sixth level, inclusive, are

successively diagnosed. If the steady state is not translated, then modification of the evaluation toolkit is required.

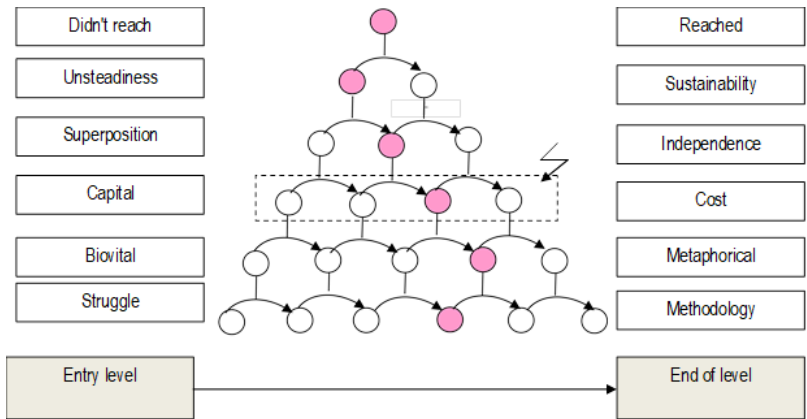


Figure 3. Modified assessment device. Interpretation of level state scales

From the itinerary presented in Figure 3, it follows that the organisation has not reached its final destination, corrective action is urgently required. Such a solution is determined by fundamentally analysing the set of collected complaints. The selected proposal, representing a control lever, is described in the form of an investment project. Once the description has been performed, the project is superimposed on the model of the operating enterprise. In this way, the fifth level provides the realisation of the Superposition technology. In the application plan, the following message is put forward as a signal warning about the stop of functioning: ‘Not enough funds are invested in the development of the organisation’. The SGR sustainable growth model should be used as a corrective mechanism (see Table 3).

Table 3

**Example of incorporating a correction mechanism
into a modified estimator**

Level	Level name	State names	Corrective mechanism	Key performance indicator parameter	Decision making
Level No 6	Endpoint	{ Life's work }	Selecting a forward-looking growth programme	SGR	Include in performance indicator
Level No 5	Life-activity	{Meaning, Production}	Financial leverage effect	ROE	No change
Level No 4	Control levers	{Superposition, Emergent, Independent}	Working capital lifecycle	CTR	No change
Level No 3	Constraints	{Capital growth rate, Sales growth rate, Profit growth rate, Value growth rate}	Performance in the norm	ROI	No change
Level No 2	Description protocols	{Bio-vital, Administrative, Conflict, Algorithmic, Metaphorical}	Corrective mechanisms for getting out of unsustainable state	Place of deviation	Long-term programme
Level No 1	Forces of destruction	{Fighting, Tradition, Economics, Facts, History, Methodology}	Breaking the organisation's bonds	Complaints	Economic factor

With the introduction of the new mechanism, the sustainable functioning of the organisation has been restored.

Thus, after careful selection, the new element was integrated into the system. The proposed approach is based on the assessment of the organisation's potential in the space of objectively set standards in relation to a finite target. The assessment is carried out taking into account the control of the system of assets invested in the business. Support of the system consisting of intangible assets for eighty and more per cent makes it possible to identify weaknesses of the organisation in the course of reproduction of the whole process, and on their basis within the framework of the technology of value-based management to justify the implementation of the best scenario of sustainable growth of both the business as a whole and its components separately.

4 Conclusion

The essence of completeness comes down to obtaining an objective conclusion about the state of the enterprise's activity at any date of its life

cycle. The degree of objectivity is manifested in the calculation of indicators that have a dimensionless value. This makes it possible to carry out the expertise on the basis of objectively set norms. In other words, the coordinate of the organisation's position in relation to a finite target is determined. Thus, the efficiency of assets invested in the organisation is controlled. Comparison of position coordinates in time forms the trajectory of changes in the enterprise potential. According to the trajectory the moments of inefficient management of entrusted resources are revealed. Such identification is reduced to the translation of dimensionless values into the cost equivalent. Now the means of assessment of the contribution of each type of asset, including intangible assets, to the final value of the enterprise are at the disposal of those interested in accurate diagnostics. On the basis of such means, weak links of the organisation are identified, which not only hinder the unlocking of potential, but are also crisis elements of the management system. Then a programme for overcoming crisis states is formed. As a result, in contrast to the use of conventional means of developing business plans, a new scenario is superimposed on the model of an existing enterprise. In terms of application, the management process can be reproduced by more than 52%. The availability of the enterprise development programme developed for the requirements of a particular business entity allows its management to receive additional confirmation of the financial condition of the multifunctional business. The developed programme is a part of the management system, the functions of which are to support a number of subsystems, including the subsystem of established performance standards, the subsystem of adopted efficiency measures, their compatibility, the subsystem of training, etc. It takes four to four years to prepare such a programme. It takes four to six months to prepare such a programme.

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