

**ISCKMC 2020****International Scientific Congress «KNOWLEDGE, MAN AND CIVILIZATION»****APPROACH MODIFICATION TO ENSURING STABILITY OF  
ECONOMIC SYSTEMS DURING INTEGRATION: KUZBASS  
HOLDINGS**

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**Abstract**

The article presents a methodological approach to ensuring economic sustainability as a kind of dynamic equilibrium of holding companies in the context of taking into account the regional specifics of the integration, which makes it difficult to apply traditional methods of researching such economic systems. The proposed directions of modification of the research apparatus make it possible to ensure a stable state of the holding's business units in two different situations, namely, with the self-organization of processes and with a centralized distribution of resources. Application of the proposed approach in the first case allows ensuring equilibrium according to D. Nash when none of the participants in the holding interaction will receive a loss (income) more than other participants. The modification directions are associated with the peculiarities of the business units functioning within the holding and the specifics of the managerial influence of the management company in these conditions. In the second situation, the management company chooses the point of application of scarce resources from the standpoint of the rating assessment of business units. In this case, the factors for toolkit modifying are the economic conditions of business units and the specifics of their interaction regarding a competition for resources. The results of the practical application of the proposed approach in the conditions of a real operating holding company are presented. It is concluded that such an approach can be applied in similar conditions due to its simplicity and versatility.

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*Keywords:* Integration, holding, balance, stability, distribution, rating



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## 1. Introduction

Modern entrepreneurial organizations see integration as one means of improving operational efficiency. The result of the integration processes is increasingly becoming conglomerate companies (diversified companies, diversified regional holdings) (Artemiev, 2019; Friedman et al., 2019; Isupova & Kostenko, 2011).

The development of conglomerate organizations and their constituent business units is a complex, multifaceted fluctuation process of evolution and transformation of both the participants themselves and their interactions. This process develops according to the laws of nonlinear dynamics and is characterized by a permanent violation of economic equilibrium between its participants (Boldyrev, 2011). Maintaining a dynamic economic equilibrium in conglomerates seems to be an urgent task. The reason is that the most significant integration goals for participants often boil down to a more stable, stable position in the market. Stability of the company, which is understood as the property of any economic system to remain viable. The ability to implement the target function of the economic system when the operating conditions and/or individual parameters of the external and internal environment change, is the essential condition for ensuring the strategic and tactical goals of conglomerate companies (Samosudov, 2012).

## 2. Problem Statement

In the Kemerovo region (Kuzbass), as a result of integration processes over the past two decades, conglomerates have been formed and are successfully functioning, the activities of which have a pronounced regional specificity (Isupova & Kostenko, 2011). The largest of the holding companies as an "anchor" enterprise include coal mining or coal processing assets, as well as enterprises, technologically related enterprises (infrastructure assets serving the main processes of the holding – transport, logistics, service engineering networks). The production structures of the holding companies have been significantly diversified by including assets of other industrial sectors – mechanical engineering, chemical industry, agriculture, construction, food production, timber processing and other industries. The market goals of the holding companies and the conditions attractive for business units and initiators of integration led to the fact that they included assets of trade, culture and sports, and the service sector. Among other things, social infrastructure facilities of small and medium-sized cities in the region, where coal mining capacities are city-forming, were included in the holding companies (Artemiev, 2019). In such a situation, the business units may compete for some of the resources of the holding companies. The state of dynamic equilibrium in the conditions of conglomerate companies means that none of the participants in integration relations experiences a loss of effectiveness from the actions or opposition of other participants (Kozhevin, 2015).

In the context of holding companies, the concept of equilibrium has also been transformed. It is closely related to the concept of sustainability. The authors are of the opinion of researchers who believe that stability is a state of mobile, dynamic equilibrium of an enterprise as a system that maintains equilibrium by counteracting external and internal factors that disturb this balance (Berezhnov, 2004). Holding companies belong to economic systems with a high level of openness. Therefore, they tend to strive for such an equilibrium, in which the destructive influence of any factor that can damage the

stability of the entire system cannot occur. This condition means accounting, including the behavior of each of the business units. In a holding company, the mechanism for maintaining the stability of the entire system and individual business units integrated into its structure may differ from the technologies for maintaining and maintaining sustainability adopted in individually managed organizations. A common feature is the inclusion of a subsystem for compensating opposing factors when a signal is received about changes in the external environment, which can pose a threat to the entire economic system of the holding. The compensation system should function actively until the moment when the parameters of the equilibrium state are provided (Kozhevina, 2012). For effective operation, a compensation subsystem must be created and tested for validity.

### **3. Research Questions**

#### **3.1. Interpretation of the concept of "economic sustainability"**

The stability of the economic system is the equilibrium of the system over a long period. In other words, the economic system can ensure the transition from one equilibrium state to another due to its adaptation to the equilibrium and stability of the external environment (Astrakov & Erzin, 2004; Samosudlv, 2018). Ensuring sustainability as a process can be considered in the following aspects: either as a transition from one equilibrium state to another; or as the elimination of deviations from the stability of the state; or as a development process with the subsequent return of the system to its original state without losing its integrity.

#### **3.2. The specifics of economic equilibrium in the context of integration**

The state of stable economic equilibrium in the interaction of several participants in holding companies requires further study in various directions. One of these areas is the study of the behavior of dependent business units regarding the use of investment resources by holding companies that can have the most significant impact on sustainability. The objectives of the holding companies' activities are ensured not only by managing the work processes of the business unit but also by implementing the synergistic effect caused by their interaction in the system of economic relations of the holding companies.

### **4. Purpose of the Study**

The purpose of this study is to develop and substantiate the directions of modification of the research apparatus based on the use of a self-regulating system model. The study is supplemented with a stage of rating assessment of interaction participants in the conditions of regional holdings to prove its suitability for studying systems in conditions of multidisciplinary integration and the possibility of practical application.

### **5. Research Methods**

The use of traditional methods for studying dynamic equilibrium in modern holding-type conglomerates is problematic for many reasons. The most significant reasons are as follows:

- economic situations in existing holding companies do not create conditions for collecting significant statistical information on the activities of business units due to its heterogeneous nature, as a consequence of the diversification of assets, different dimensions of applied measurements and instability of periods of maintaining the uniformity of activities;
- there are practically no conditions for the formation of arrays of information sufficient to obtain reliable conclusions in the conditions of holdings;
- the complexity and versatility of the strategic and tactical tasks of the development of holding companies produces a high level of dynamism of indicators and applied methods for evaluating research objects – investment resources;
- in the conditions of conglomerates, it makes no sense to conduct economic experiments, since the operating conditions of the business unit E are so different that it does not seem valid to extend the results and conclusions to other entities.

It seems appropriate to use methods for modeling corporate systems, as well as elements of the theory of corporate interaction, taking into account the above arguments for determining the sustainability of holding companies (Astrakov & Erzin, 2004; Kozhevina, 2015; Samosudov, 2012). In the conditions of Kuzbass regional holdings, these models should be modified by applying such an approach that allows considering the two most typical business situations of resource allocation, namely:

- a situation when each of the participants in integration relations has a certain amount of their resources, which he can use to counteract and level the market influence of opponents (other participants in relations, neighbors);
- a situation where resources are used centrally allocated by the management company to ensure dynamic balance.

In the first situation, equilibrium is ensured by maintaining a balance of interests of all business units that make up the holding companies, each of them supporting its strategy and its own set of resources that it can use to influence neighbors for its purposes (Nash, 1961).

The second situation is related to the activities of the management company for the centralized distribution of the allocated set and the number of limited resources (for example, funds intended for investment in innovative projects that are significant for the management company, carried out by business units). At the same time, business units belonging to diversified companies compete with each other for obtaining this resource. The study of such situations is proposed based on an element of the theory of stable corporate equilibrium.

In this regard, one of the approaches to studying the interaction dynamics of participants in this system is proposed. It is based on the model of a self-regulating system (Albin & Hormozi, 1983; Gibbons, 1992). This article proposes one of the options for applying such models in the context of regional holdings.

For applying this model in order to calculate possible changes in resource flows within the business model of holding companies, it is proposed to use the following directions of its modification and conditions:

- to determine the characteristics of the resource flows of interaction participants within holding companies, the number of such participants is limited to three business units;

- the algorithm for the redistribution of resources should include such a step of overflow (flow modification), which should be at least five and no more than 15 % of the size of the resources allocated by business units;
- the results obtained should be recommendatory and be subjected to additional expert assessment by a higher level of management or independent experts.

## 6. Findings

In the course of researching the specifics of regional non-core integration, we investigated typical cases, which in the most general form can be reflected by the result below. Suppose that the system of integrated business units  $S$  is functioning, characterized by a certain developed level of corporate relations, managed from an internal center – the management company. Its structure includes various management companies that interact with each other by redistributing potential (available resource), which can potentially be directed to the development of other participants in the  $S$  system (elements). To each element  $I = 1, \dots, N$  from  $S$ , we assign a vertex  $i \in V = \{1, 2, \dots, n\}$  of the graph  $G = (V, E)$ , which we call the interaction graph. In this graph, the arc  $(i, j) \in E$  exists only if the interaction of elements  $i$  and  $j$  take place. The essence of this interaction depends on the area in which they function. Interaction can be about cooperation, or maybe about competition for limited resources, the distribution of which is decided by the management company. Most often, interaction arises about the allocation of a limited resource. Then the goal of each participant in relations in holding companies may be some advantage over other business units in terms of obtaining a particular resource. This advantage can be expressed, for example, in a higher performance efficiency in the previous periods of operation, which suits the management company, or greater demand for products or services. These advantages let this business unit to receive resources for development without harming other participants by the management company since this is precisely the condition for balanced development.

To consider this situation, suppose that three business units independently allocate their financial resources to improve their competitive position. The challenge is to provide a behavior model in which the state of their interaction can be considered stable. This state suits all business units in terms of their interests. This state ensures that there is no contradiction between the goals of business units and management companies.

To test the possibilities of such a mechanism for ensuring equilibrium in conglomerates, we used the actual data of three business units that strive for a stronger competitive position so as not to cause negative phenomena in the economy of other participants in holding companies. These are Giprostroy LLC (BU-1), Kuzbas-Sugol OJSC (BU-2) and Agroprominvest LLC (BU-3), which have, among other similar activities, the provision of fixed assets for rent. As such, they can potentially create a conflict of interest. However, as a research situation with a high degree of typicality, it can be considered in this study. As an example, it is proposed to consider a situation when each of the organizations allocates its financial resources in various sizes to counter the interests of other business units:

BU-1 – of 40 million rubles;

BU-2 – of 25 million rubles;

BU-3 – of 20 million rubles.

It is necessary to reflect a stable state that suits all participants in the interaction, taking into account their economic interests, i.e. find such a distribution of resources that will approach sustainable. The degree of closeness of such a distribution to a stable one will depend on the behavior of the stabilization vector  $f = (f_1, f_2, f_3)$ .

The opposition of the participants in the interaction can be estimated by the formula

$$c_{ij} = c(x_{ij}, x_{ji}) = x_{ij} - x_{ji}, \text{ i.e. } a = 1, b = -1.$$

The first BU-1 assesses its position concerning other participants as more reliable (stable, solid). The second participant in the interaction (BU-2) can be considered as a threat to the third, which has half the safety margin (10 versus 5).

The algorithm for the redistribution of financial resources in this model works as follows. Taking into account the change step specified at each iteration (according to the formula) changes the state of the system. As a result, we obtain a distribution that is as close as possible to the equilibrium (stable) one, which is calculated by the formula:

$$X^* = \begin{matrix} & 0 & 22,5 & 17,5 \\ & 22,5 & 0 & 2,5 \\ & 17,5 & 2,5 & 0 \end{matrix} \quad f=(0; 0; 0).$$

Such a distribution suits all the participants in the interaction. This distribution means that BU-1 is recommended from the 40 million rubles at its disposal for distribution to be directed to overcome any resistance or danger (threat) from BU-2 – 17.5 million rubles, and inside BU-3 – 22.5 million rubles. The goal of the rest of the participants in the interaction is to provide conditions for economic equilibrium. To do this, they also need to accept the recommended distribution, which will lead to a complete leveling of threats from border participants. That is, this distribution will correspond to the interests of all participants.

The second situation of interaction within the holding assumes that the management company distributes resources centrally. Regarding this situation, it should be noted that it could be investigated based on another approach, also based on the achievement of equilibrium. In this case, the conditions of equilibrium must be met, the factor of the scarcity of resources and the requirement of their redistribution only to achieve equilibrium must be taken into account. According to research, in the conditions of Kuzbass holdings, the effectiveness of business projects is, or every time a subject of special subjective consideration and a "manual" financing process or their effectiveness is not evaluated at all. These circumstances are typical even for those assessed those criteria established in advance by the management company and based on the approved methods. Business decisions are made based on "operational necessity", not efficiency considerations.

The purpose of using models of intercompany interaction in such situations is to obtain such parameters for the development of a business unit that provide a situation of equilibrium. For such a situation, it is proposed to apply an approach based on the choice of the point of investment application using a rating assessment of business units applying for investment. The application of a business unit rating model based on this methodology involves the following steps:

- development and approval of indicators for monitoring the performance of a business unit, taking into account their industry affiliation, specifics of management and goals;

- formation and approval of reports on the results of the business unit's activity;
- development and establishment of criteria for internal audit;
- conducting an internal audit procedure for the processes identified in the activities of the business unit;
- determination of the specifics of the rating assessment of a business unit (establishment of weighting factors);
- determination of the rating of a business unit by a specially created counting commission based on reports and results of monitoring activities by processes;
- making decisions on the allocation of financial resources for the development of a business unit based on a rating assessment.

The application of the rating assessment of the activity of a business unit has some peculiarities in the conditions of holding companies.

The final rating value is calculated based on the following data:

- the results of the business units activities presented in the reports on the work for the period established by the internal regulations;
- the results of internal and external audits conducted under the schedule and regulations adopted by the management company;
- evaluations of divisions according to "basic indicators of performance discipline" for the selected evaluation period (evaluation is made by officials on a scale approved by the management of the Criminal Code).

The rating assessment of the activities of a business unit is carried out in two directions:

1. "Target rating" demonstrates the achievement of the business unit of strategic priorities, quality goals, the performance of financial indicators, as well as the implementation of key indicators characterizing the performance of the business unit for the reporting period. This rating is based on "target indicators" and "growth indicators". Their number should not be vast in order to avoid confusion and difficulties in the technology of assessments. Practice shows that the most acceptable number is from 3 to 20.

2. "Overall rating" shows the level of performance by each business unit of all indicators of the rating assessment. The assessment is carried out in per cent or fractions of a unit and determines the degree of fulfilment of the specified process parameters.

In this case, it is necessary to introduce some concepts to clarify them. In this study, the following definitions apply:

The weighting factor is a numerical indicator that reflects the importance of the process for the business unit and (more often) for the management company and is established by experts.

The basic indicators of executive discipline is an expert assessment of the work of a business unit. Business units reflect the target and current activities, the execution of orders from top management, the execution of decisions of collegial bodies, compliance with internal regulations, financial discipline, preparation of planning and reporting documentation and other types of activities.

Baselines are set so that the quantitative and qualitative performance of the business unit is comprehensively measured.

The rating score is a numerical indicator obtained as a result of a calculation according to the methodology adopted by the management company and reflecting a set of quantitative assessments of the results of the business unit's processes, measured for a certain period based on the results of internal audit and monitoring of processes for the same period.

Performance discipline indicators are an expert assessment of the work of a business unit in areas (groups of assessment indicators) that are most significant for a business unit in the period being assessed.

The threshold rating score is the final rating score for each type of activity (process) of the business unit, provided that all rating indicators fully comply with the threshold values. Growth indicators include indicators, the actual value of which exceeds the threshold. The level of fulfilment of the threshold rating score is calculated as the ratio of the unit's final rating score to the threshold rating score.

Targets are numerical values of indicators that measure the achievement of goals in all significant (key) areas of activity, established for a certain period. Therefore, the target rating measures the degree (level) of achievement by business units of strategic priorities, quality goals, the performance of financial indicators, as well as the implementation of key indicators characterizing the performance of the business unit in the reporting period.

The overall rating measures the level of fulfilment of the business unit of all indicators of the rating assessment and characterizes the level of fulfilment of the threshold rating score, which is determined for each type of activity of the business unit, provided that all rating indicators fully comply with the threshold values. Thus, the overall rating of a business unit is the ratio of the final rating score to the threshold rating score.

## 7. Conclusion

Summarizing the above, we can conclude:

- the state of dynamic equilibrium has its specific characteristics in the conditions of integrated companies of a diversified type – holding companies;
- for conglomerate companies, in order to ensure dynamic balance, it is possible to use an approach in the management process based on the use of elements of the theory of corporate interaction;
- taking into account the specifics of large regional conglomerates formed in the Kemerovo region (Kuzbass) requires a modification of this approach, which makes it possible to consider two typical situations in the process of allocating resources of such companies to ensure their equilibrium development.
- the basis of the modified approach is the use, within the framework of one methodology, of two methods of maintaining equilibrium in the allocation of resources: based on self-regulation mechanisms and based on a rating assessment of the performance of business units competing for resources.

The proposed approach is applied in the conditions of a real conglomerate company operating in the Kemerovo region. This approach has shown high efficiency of its application, as well as simplicity and versatility, which makes it possible to apply it in other companies of this type. Its modification allows, on the one hand, using self-regulation mechanisms, on the other, justifying the choice of a



business unit that most closely meets the requirements of the management company when allocating financial resources to them for investing in projects and processes.

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