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METHODOLOGY OF ECONOMIC AND MATHEMATICAL ASSESSMENT FORMATION OF HOLDING STRUCTURES ACTIVITIES

Abstract. The author's definition of "a holding structure" is proposed in the article. A number of factors that make up the prerequisites for integration processes in the business of the holding union type are analyzed. The mechanism of economic and mathematical evaluation of the holding companies is investigated through introduction of the expediency assessment coefficient of economic restructuring of holding structure subsidiaries, the profitability ratio of a holding structure in the process of its formation, and the current profitability factor of a holding structure during follow-up. The calculation of the proposed indicators on the basis of the financial statements of the Corum Group Engineering Holding and its subsidiaries is fulfilled.

Key words: holding structure, affiliate, economic restructuring, the coefficient of expediency of economic restructuring, profitability ratio of a holding structure, methodology of assessment.

Formation of the problem. Progressive development of economy, steady progress in scientific and technical fields and emergence of creative approaches in management provoke the expansion of integration processes at micro and macro level. The question of the union of enterprises is especially pressing both at the time of structural reconstruction of the country's economy and in terms of various crisis situations and at the time of stable functioning.

On the basis of intertwining monopoly and competition and also simultaneously with improvement of business activities types there are being developed and formed new types of relations between individual enterprises and there are being created different variants of their unions. With development of the economic system some types of unions gradually lose their viability and under existing conditions they become irrelevant while others on the contrary begin to develop and their number is growing.

There is a sufficient number of motives for integration and conduct of joint activity between individual enterprises but they are different for a specifically taken enterprise. The following motives are the defining ones: the reduction of tax burden; the conquest of new sales markets; the search for more favorable conditions of purchasing raw materials and constitutive elements; the access to the latest scientific and technical potential; the expansion of the field of information support; the reduction in costs and risk sharing when forming additional production capacities; the mastering of new arenas of production and economic activities; the expansion of the geographical penetration zone; the need in significant capital investments; management efficiency improvement; strict "game rules" in the modern market and an extremely high level of competition [21, p. 238].

Implementation of the list of motives for the union of enterprises makes it possible to significantly improve the efficiency of their functioning which covers an increase in production capacity, increase in competitiveness, more qualitative management of organization which is very significant for today from an economic point view.

There exist a sufficient number of ways and forms of union, the choice of the most acceptable one depends on financial and economic condition of organization and economic situation in the country in general. Today the practice of holding structures creation, efficiency of which is shown by foreign experience, has become rather widespread. It is impossible for Ukraine to fully adopt foreign practice of holdings creation since the domestic

economy is characterized by a number of its features but it can use it as the basic one.

Analysis of recent research and publications. A number of scientists, namely: M.M. Leshchenko, L.I.Donets, O.M.Ivashchenko, H.V. Mys'kiv, N.V.Shevchenko, S.V. Naumenkova, B.I. Siurkalo, M.B. Naichuk-Khrushch, N.Ye. Seliuchenko, V.V. Kozyk, O.V. Shaposhnikov and many others were engaged in the research of theoretical and methodological foundations of holding structures of Ukraine functioning and foreign holding companies. However, it is worth noting the insufficient level of scientific disclosure of the selected themes and the need for further development of the scientific direction associated with the assessment of holding structures involving economic restructuring.

The objective of the article. The main idea of the article is methodology of economic and mathematical assessment formation of holding structures activities.

The presentation of the main material of the research. Currently holding companies are the most popular form of the union. It is believed that holding companies appeared in the 19th century namely in 1888-1889 when legislation in the USA in the state of New Jersey gave companies the permission to purchase and possess the stock shares of one or more other firms [18, p.125].

Management of holding structures in the period of transformation processes in the economy remains topical which in turn assigns a new task to a holding structure – the participation in the process of economic restructuring of subsidiary enterprises.

In our opinion, a holding structure is a form of joint-stock company which is created for the purpose of possessing stock block of subsidiaries and the establishment of monitoring at all levels of subsidiary enterprises (production, finances, marketing, human resources policy, investment activities, management) forming relationships with all their structural units partially differentiating the functions of control including performing the coordination, monitoring and supervision under the conditions of economic restructuring of an enterprise [5; 3, p.64].

Holding structures in Ukraine are functioning in accordance with the national law. Public policy as a mechanism of administrative and legal regulation of economic and social processes plays a leading role in the formation and adjustment of activities of enterprises [6, p. 33-34].

Assessment of the activities of a holding structure is complex and multistage process. Typically, in such a way the assessment is conducted on the basis of the financial statements of subsidiaries and consolidated accounting of a holding structure [1, p.10]. At present, there exists a list of financial coefficients that are used in the process of analysis and financial management, namely: the indicator of consolidated profit of a holding structure; the coefficient of profitability of holdings creation; the coefficient of the value of management; the indicator of investment attractiveness of potential subsidiaries; the indicator of the level of economic efficiency of the formation and activities of a holding structure; the indicator of portfolio risk of a holding structure; the coefficient of financial independence of subsidiaries; the ratio coefficient of borrowed and equity capital; the coefficient of financial stability of a holding company; the level of self-financing of subsidiaries; the coefficient of corporateness [7, p. 30; 8, p.121; 9, p.118; 10, p.10-11, 11, p.98-101, 13; 14; 15].

Having accomplished the review of the literature on the problems of assessment and efficiency of holding structures and having analyzed the shortcomings of existing indicators the introduction of the expediency coefficient of a holding structure economic restructuring (k_{ER}^{d}) should be considered important.

The expediency coefficient of economic structure depends on many conditions which are to be checked when calculating this particular coefficient.

The expediency coefficient of individual enterprises economic restructuring will be influenced by such constituents:

1) the losses of enterprise and their change (increase in losses will be indicative of the expediency of carrying out economic restructuring, L);

2)a significant change of company's profit (reduction of the profit level and its transition into the category of losses will be indicative of the expediency of carrying out economic restructuring, P);

3) a significant change in the volume of payables (excessively large payables are indicative of the solvency loss possibility and the transition to unstable financial condition and complete crisis state of an enterprise that is the basis for immediate restructuring Ps);

4) a significant change in the amount of receivables (an unjustified increase in receivables is not a positive tendency for enterprise since it increases the level of the riskiness of business dealing and like payables it is indicative of an unstable financial condition, Rs).

In other words, the coefficient of economic expediency of economic restructuring can be entered if at enterprise there is met at least one of these conditions:

$$\begin{cases} I_1 = \dfrac{L^1}{L^0} > 1 \\ I_2 = \dfrac{P^1}{P^0} < 1 \\ I_3 = \dfrac{AP^1}{AP^0} > 1 \\ I_4 = \dfrac{AR^1}{AR^0} > 1 \end{cases}, \quad (1)$$

If the enterprise's financial state is unstable one of the following conditions when enterprises' profits go to category of losses and losses respectively increase can be done:

$$\begin{cases} I_1 = \dfrac{L^1}{L^0} > 1 \\ I_2 = \dfrac{P^1}{P^0} < 1 \end{cases} \rightarrow \text{or } I_2 = \frac{L^1}{P^0} < 1,$$

or $$I_2 = \frac{L^1}{P^0} >> 1, \quad (2)$$

where I_1, I_2, I_3, I_4 are the indicators of conditions fulfilment for expediency of the introduction k_{ER}^d; $\frac{L^1}{L^0}$ is the ratio of a subsidiary losses of the analyzed period L^1 to the losses of the previous period L^0 (normative value of this ratio should be greater than unity); $\frac{P^1}{P^0} < 1$ is the profit ratio of the analyzed period of a subsidiary to the profit of the previous period (normative value should be less than unity); $\frac{AP^1}{AP^0} > 1$ is the ratio of the payables amount of the subsidiary's analyzed period AP^1 to the amount of payables of the previous period AP^0 (normative value – greater than unity); $\frac{AR^1}{AR^0} > 1$ is the ratio of the receivables amount of the subsidiary's analyzed period AR^1 to the amount of receivables of the previous period AR^0 (normative value – greater than unity); $\frac{L^1}{P^0}$ is the ratio of the subsidiary's losses of the analyzed period L^1 to the profit of the previous period P^0.

However, complex fulfillment of the above conditions is also possible. In such a situation we introduce gross coefficient g_i ($i = \overline{1,4}$) where there is a closed system that means that there is considered the equality of the performance of four indicators $g_1 = g_2 = g_3 = g_4 = 0{,}25$, $g_1 + g_2 + ... + g_4 = 1$.

The situation in which at least one of the suggested ratios of the system corresponds to the critical range of normative value is evidence of the need for the introduction of the expediency coefficient of economic restructuring.

So,

$$k_{ER}^d = g_1 \times I_1 + g_2 \times I_2 + g_3 \times I_3 + g_4 \times I_4 \quad (3)$$

If at least one of the suggested ratios of the system has a deviation from a normative value it is evidence of the expediency of economic restructuring implementation.

As the example, for calculation we will take the indicator of financial activities of Corum Group Engineering Holding which consists of the following companies: Druzhkivka Engineering Plant JSC, Horlivka Engineering Plant JSC, Donetskhirmash JSC and Corum Shakhtspetsbud LLC.

1. Druzhkivka Engineering Plant JSC:

$$\frac{L^1}{L^0} = \frac{56440}{27585} = 2{,}05; \frac{P^1}{P^0} = \frac{125437}{193814} = 0{,}65;$$

$$\frac{AP^1}{AP^0} = \frac{3750}{10117 + 125223} = 0{,}03;$$

$$\frac{AR^1}{AR^0} = \frac{257124 + 65170 + 7150}{148200 + 32758 + 5816} = 1{,}76.$$

Thus,

$$k_{ER_1}^e = 0{,}25 \times 2{,}05 + 0{,}25 \times 0{,}65 + 0{,}25 \times$$
$$\times 0{,}03 + 0{,}25 \times 1{,}76 = 1{,}12.$$

2. Horlivka Engineering Plant JSC:

$$\frac{L^1}{L^0} = \frac{10198}{17200} = 0{,}59; \frac{P^1}{P^0} = \frac{249252}{198347} = 1{,}26;$$

$$\frac{AP^1}{AP^0} = \frac{12750+582}{58200+1120} = 0{,}22;$$

$$\frac{AR^1}{AR^0} = \frac{98136+68750+25471}{75782+23516+7727} = 1{,}8.$$

$$k^e_{ER_2} = 0{,}25\times 0{,}59 + 0{,}25\times 1{,}26 +$$

$$+ 0{,}25\times 0{,}22 + 0{,}25\times 1{,}8 = 0{,}97.$$

3. Donetskhirmash JSC:

$$\frac{L^1}{L^0} = 0;\ \frac{P^1}{P^0} = \frac{86375}{47498} = 1{,}82;$$

$$\frac{AP^1}{AP^0} = \frac{43950+28879}{19670+7181} = 2{,}71;$$

$$\frac{AR^1}{AR^0} = \frac{26785+13812+4125}{28300+15711+5137} = 0{,}9.$$

$$k^d_{ER_3} = 0{,}25\times 0 + 0{,}25\times 1{,}82 + 0{,}25\times$$

$$25\times 2{,}71 + 0{,}25\times 0{,}9 = 1{,}36.$$

4. Corum Shakhtspetsbud LLC:

$$\frac{L^1}{L^2} = 0;\ \frac{P^1}{P^0} = \frac{42800}{55125} = 0{,}8;$$

$$\frac{AP^1}{AP^0} = \frac{20430+8160}{12800} = 2{,}23;$$

$$\frac{AR^1}{AR^2} = \frac{10080+13381+2300}{12989+17220+9500} = 0{,}65;$$

$$k^d_{ER_4} = 0{,}25\times 0 + 0{,}25\times 0{,}8 + 0{,}25\times$$

$$\times 2{,}23 + 0{,}25\times 0{,}65 = 0{,}92.$$

Having calculated k^d_{ER} we suggest calculating the profitability of a holding structure in the process of its formation $P_{HS_{\text{in the process of its formation}}}$ that is expedient to be calculated according to the suggested model:

$$P_{HS_{\text{in the process of its formation}}} =$$

$$= \frac{P_{PC}\times R^L_{PC} + P^1_S \times R^L_1 \times k^d_{ER_1} + \ldots + P^n_S \times R^L_n \times k^d_{ER_n}}{E_1 + E_2 + \ldots + E_n}, (4)$$

where P_{PC} – is net profit of a parent company; – is net profit of the 1st subsidiary; P^n_S – is net profit of the nth subsidiary; R^L_{PC} – is risk of the profit loss by a parent company; R^L_1 – is risk of the profit loss by the 1st subsidiary; R^L_n – is risk of the profit loss by the nth subsidiary; $E_1, E_2, \ldots, E_n$ – are diverse expenses of a holding structure.

It is difficult to calculate accurately the risk of the profit loss (R) since it is practically impossible to take into account all the factors that affect the change of its value. Quantitative determination of risk in absolute terms does not always provide the possibility to accurately assess the riskiness of certain activities conduct. In order to find a compromise and take into account the value of equity funds there are introduced the dimensionless indicators. All of them are risk coefficients and each time it is conditioned what kind of risk is meant [19, p 64].

For example, risk coefficient of total losses of an enterprise uncovered by the value of own equity will be calculated according to the formula suggested by [4]: $R = \frac{L\times P}{EF}$ where L is the maximum value of total losses of an enterprise uncovered by the value of own equity; P is the probability of losses; EF is the value of own equity.

Acceptable risk is in the boundary limits which are controlled as part of financial management system according to the expenses size of holding structure subsidiaries activities [20].

In the literature various authors suggest the scale of gradations from minimum to maximum values for aforementioned risk coefficient that make it possible to be well versed in their values.

According to [4] we suggest using the following scale of risks gradations (tabl. 1).

While calculating the profitability of a holding structure in the process of its formation and evaluation of profitability of its further activities we will use acceptable level of risk according to the scale – 20% [16, p.98].

Then we need to focus on analyzing and determining the expenses of a parent company of a holding structure. Taking into consideration a large scale of a holding structure, the system of expenses must be clearly formed and divided into expenses of a parent company (of higher level) and expenses of subsidiaries (of lower level). The holding structure is created for the purpose of activities financial management of subsidiaries system thus acting as the core of financial allocation, planning and control [2, p. 40; 17, p. 92].

A parent company being a control center may carry out a number of expenses which will be combined into four groups according to the rules of bookkeeping and tax reporting [12, p.141]:

Table 1

Scale of acceptable values of profit loss risk coefficient

Gradation of risk	Acceptable value
Acceptable	<0,25
Permissible	0,25-0,5
Critical	0,5-0,5
Catastrophic	> 0,75

– administrative expenses (expenses on auditing services, expenses and ensuring current activities of a parent company (utilities, etc.), expenses on marketing services, expenses on training of management team (seminars, courses, presentations and business trainings). Expenses on improving knowledge and skills of management team of a holding structure is an important item of expenses since effective functioning of such a complex, multifaceted and wide network formation as a holding structure depends on the quality of management process) (E_1);

– financial expenses (expenses on purchasing controlling stakes of subsidiaries at the time of holding structure formation; expenses on restructuring measures at the enterprises which are its structural units and are in the state of solvency loss, expenses on implementing domestic crediting of subsidiaries, the expenses caused by additional emission of shares, expenses on paying dividends to shareholders of a holding structure) (E_2);

– expenses on wages (expenses on wages, expenses associated with taxing (payroll taxes, social contributions for employees of a holding structure administration) (E_3);

– other expenses (expenses on scientific, technical and technological innovations; expenses associated with the creation of reserve funds; insurance expenses of various types of risks; expenses on acquisition of new offices, cars that serve the needs of a parent company; expenses on obtaining patents, inventions) (E_4).

The calculation of current profitability indicator of a holding structure R^*_{HS} will be the next stage after calculating the profitability of a holding structure in the process of its formation. By the current profitability of a holding structure we mean the profitability of the already formed and operating structure which combines the activities of the appropriate number of subsidiaries in contrast to the profitability of a holding structure in the process of its formation by which we understand the activities in the process of its organization with the participation of economic restructuring of subsidiaries in fact in unfinished process.

Coefficient R^*_{HS} will be calculated according to formula:

$$P^*_{HS} = \frac{P_{PC} \times R^L_{PC} + P^1_S \times R^L_1 + ... + P^n_S \times R^L_n}{\sum E}, \quad (5)$$

where P_{PC} – is net profit of a parent company; P^1_{PC} – is net profit of the 1st subsidiary; P^n_{PC} – is net profit of the nth subsidiary; R^L_S – is risk of profit loss by a parent company; R^L_1 – is risk of profit loss by the 1st subsidiary; R^L_n – is risk of profit loss by the nth subsidiary; $\sum E$ – are total expenses of a holding structure.

Total expenses are equal to the sum of all current expenses which a holding structure has in the process of functioning, a list of which is given above:

$$\sum E = E_1 + E_2 + ... + E_n \ , \quad (6)$$

Thus, we will calculate the profitability of a holding structure Corum Group: in the process of its formation:

$$P_{HS_{\substack{\text{in the process} \\ \text{of its formation}}}} =$$

$$= \frac{138787 \times 0,2 + 125437 \times 0,2 \times 1,12 + 249252 \times 0,2 \times 0,97 + 86375 \times 0,2 \times 1,36 + 42800 \times 0,2 \times 0,92}{677658 + 418180 + 2116789 + 219045} =$$

$$= 0,0395.$$

After the completion of formation process we can calculate current profitability of a holding structure. After formation process completion of a holding structure the groups of expenses remain unchanged, however the list of expenses attached to a certain group change. So, for example while calculating we will not include expenses on purchasing controlling stakes of subsidiaries, expenses on restructuring measures at enterprises which are its structural units and are in the state of solvency loss, expenses on domestic crediting of subsidiaries and other expenses.

So,

$$P^{*}_{its} = \frac{138787 \times 0,2 + 125437 \times 0,2 + 249252 \times 0,2 + 86375 \times 0,2 + 42800 \times 0,2}{677658 + 418180 + 2116789 + 219045} =$$

$$= 0,0375.$$

Thus, in the example case of the existing methodology process for evaluation of holdings we see that the current profitability of an existing holding structure is almost the profitability as a holding structure at the time of its formation. Reducing the costs of different categories will continue to increase the profitability of the holding structure.

Conclusions and perspectives for further research. Financial management and complex formation assessment of a holding structure with the participation of economic restructuring is a complex process influenced by a number of factors and conditions which were analyzed in the paper. Great importance belongs to expediency assessment coefficient of economic restructuring of a holding structure subsidiaries and to a complex of conditions and indicators and gross coefficient of each ratio. However, the determination of a complete list of such factors requires further research.

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