



DEVELOPMENT OF EVALUATION THE MARKET VALUE OF THE ENTERPRISE IN THE SYSTEM OF ACCOUNTING AND ANALYTICAL SUPPORT

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ABSTRACT

The article explores the process of development the evaluation of market value of the enterprise in the system of accounting and analytical support. The purpose of our research is to determine the methodology for evaluation the enterprise value that provides a reliable and reasonable calculation of indicators enterprise value based on the data of the accounting system. A hypothesis was formulated, which later on received a confirmation. A comparative analysis of the characteristic features the application of different evaluation approaches of the enterprise (income, cost, market) was carried out. The authors determined that the formation of the market value of the enterprise should be carried out in the system of accounting and analytical support of the enterprise and determined by the indicator of net assets, which should be adjusted to the predicted level of profitability taking into account alternative risk-free investments and the risks level of the enterprise.



The proposed concept for determining the market value of the enterprise provides a reliable and reasoned calculation of value indicators based on the data of the accounting system for both profitable and unprofitable enterprises.

Keywords: accounting, evaluation, market value, enterprise, net asset

1. INTRODUCTION

The process of determining or calculating the value of the enterprise is a complex dynamic phenomenon based on the data of the system of accounting and analytical support of the enterprise (Figure 1). The subsystem of determination or formation of the enterprise value can be implemented within the framework of the accounting system with the execution of additional analytical procedures. The additional analytical procedures provide determination of fair asset value and liabilities, evaluation of net assets of the enterprise, anticipated net profit / loss taking into account its dynamics in previous years, calculation the indicator of market value of the enterprise with determination of changes in return on equity in the expected period.

The process formation of enterprise value reflects the complex of management actions, which involves identifying, evaluation and regulating the influence of factors of enterprise value that generate or destroy of the enterprise value. The macro-environment factors reflect the economic, political, legal, technique and technological phenomenon. This phenomenon is independent of the enterprise and requires the adaptation of its activities to the nature of the influence of such factors.

The mezzanine environment reflects the specifics of the functioning of the industry, including the features of the raw material base, the complexity of the activity, and the nature of innovation, which should be taken into account in the management of formation of the enterprise value. The microenvironment is formed in view of the specifics of the enterprise. It depends on the structure of capital, the establishment of interrelationships between departments, the quality of management and may change under the influence of management decisions.

In national and foreign publications, the problems of using different methods for determining or evaluation the value of an enterprise are considered, which, given the use of identical factors, factors of enterprise values and output data, as a rule, give different values.



The urgency of solving the problem of choosing the best methods for evaluation the enterprise value is due to the lack of clearly established limitations on the application of appropriate methods of evaluation, insufficient justification of mathematical variables and fuzzy interpretation of the results obtained and the parameters of their reliability, imperfection of the current accounting system.

The current accounting system generates financial statements that complicate the process of determining the enterprise value. In this regard, the non-analytical application of the proposed methods for evaluation the enterprise value doesn't allow to properly take into account the information formed in the accounting system, the influence of factors of macro-, mezzo- and microenvironment, and it's ineffective in an unstable economic environment. If the evaluation the enterprise value is not supported by relevant information about its activities, while anticipated data is not based on accurate evaluation methods, the statements about the enterprise value and the evaluation results contained are inappropriate for sound economic decisions.

2. REVIEW OF EMPIRICAL LITERATURE

Let us consider more in detail the proposed economic methods for enterprise value, which in the majority are based on the accounting data and financial statements.

The enterprise value, as a result of its activity, is based on the evaluation methodology (income approach – in the views of economists, cost approach – in the views of accountants), which don't explain the nature of value as an independent economic category.

The comparative analysis of the specific features of applying different approaches to evaluation the enterprise value allows for the following conclusions:

1. The cost approach should be used for enterprises with unstable financial results, as well as for newly created and technologically unique enterprises. It should be borne in mind that the results of evaluation the enterprise value using the methods of cost approach in terms of undervaluation of the intangible benefits of the enterprise cause a decrease in its value.
2. The income approach to evaluation the enterprise value allows obtaining the most accurate results, if the investigated enterprise is not newly created, information



about its activities is reliable, transparent and accessible, and the profitability of the enterprise is relatively stable in the last few years of functioning.

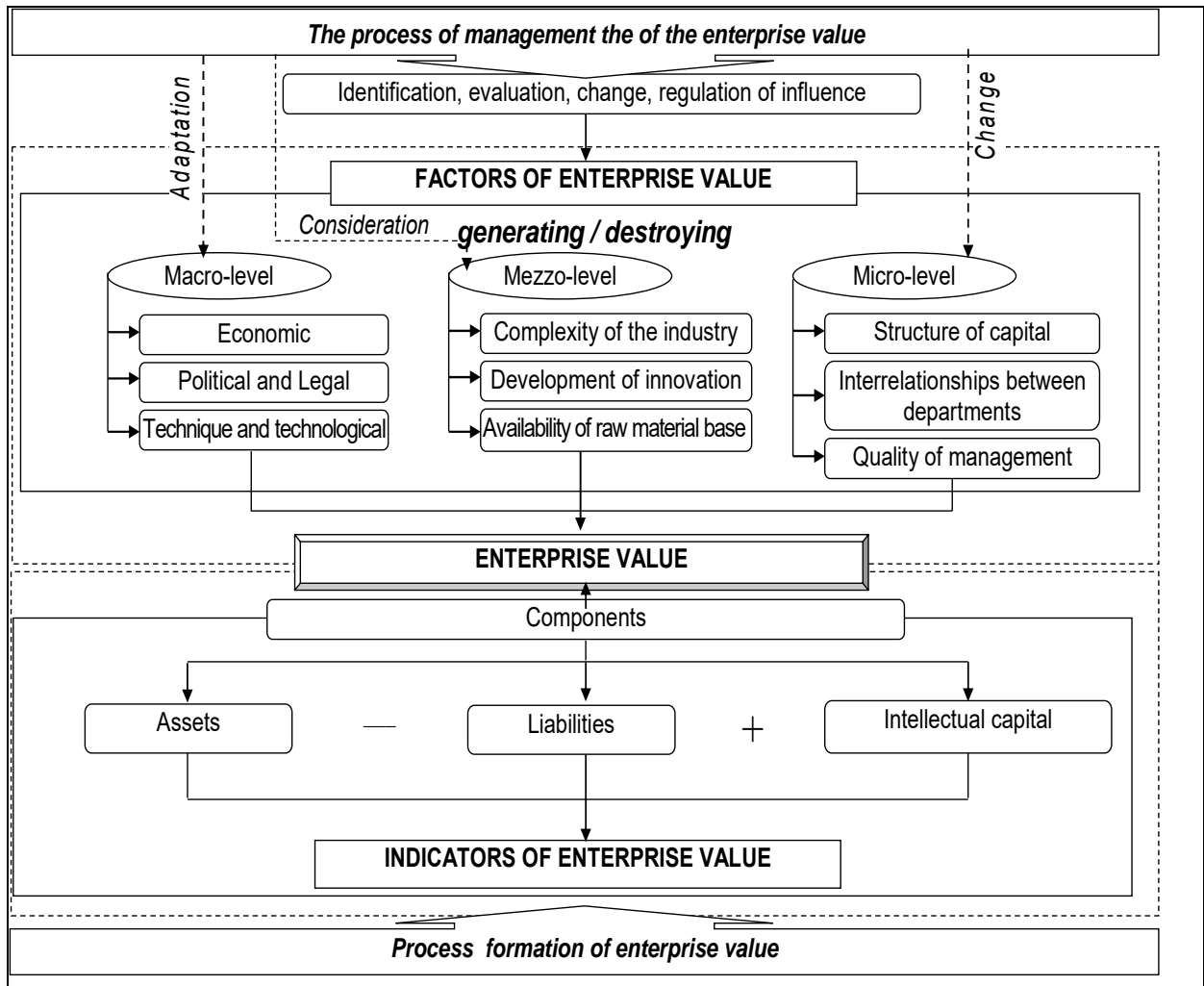


Figure 1: System formation and management of enterprise value
 Source: Kozodaev and Pylov (2003)

3. The market approach to evaluation the enterprise value can be applied to both profitable and non-profitable enterprises. In this case, the determining factor for the evaluation of this approach is the presence of enterprises similar to the research. This approach will also be more effective for newly created enterprises involved in providing services or performing work that is not unique in a particular market segment.

The purpose of our research is to determine the methodology for evaluation the enterprise value that provides a reliable and reasonable calculation of indicators enterprise value based on the data of the accounting system.

Advantages, disadvantages and procedures for using different methods of evaluation the enterprise value, including variations the methods of income, cost and market approaches, restriction of it use are disclosed in the scientific works of (KOZODAEV; PYLOV, 2003; CHEBOTAREV, 2009).

The detailed analysis the methods of evaluation the enterprise value are given in the research papers of Polish researchers. In particular, Michula (2012) reveals the classification, advantages and disadvantages the methods of evaluation the enterprise value in the context of income, cost, market and mixed approaches. The author also highlights non-comparable methods of evaluation, which include methods the theory of options, time delay methods, MDR method as a separate type. Nogalsky and Zalewski (1998) are highlighted practical approaches to the implementation the methods of evaluation for cost approaches (method of disposal value, method of net asset value) and income approaches (method of discounting cash flows).

The Polish scientists consider that the most universal and reliable method of evaluation the enterprise value is the method of discounting cash flows. So Besyada (2010) and Majewski (2010) argue that the methods of the income approach best reflect the market value of the enterprise. The enterprise value can be estimated reliably only if, at present, the value of the income that will be generated by the enterprise in future periods will be calculated.

Russian scientists also support this position. As noted by Palamarchuk (2004), the method of discounting cash flows (DCF) is a key method of business valuation. This is the most popular method, since it mainly implements the basic prerequisite for business valuation, has the largest theoretical base and flexibility. Russian scholars also support this position.

Shcherbakov and Shcherbakova (2006) disclose conditions and restrictions on the use of the method of discounting cash flows. Thus, the authors focus on the fact that this method gives the most accurate results when estimating enterprises that have a history of economic activity. Such enterprises are in a stage of growth or stable economic development. Accordingly, it is necessary to apply carefully the method of discounting cash flows to evaluation the new enterprise.

The method of discounting cash flows for share capital and the peculiarities of creating a positive and negative market value added for shareholders (MVAe) are



researched in the works of (MYKOLAYEK-GOTSEYN, 2010). In particular, the author draws attention to the need to differentiate the value created by investments of shareholders and the value generated through investment in assets.

Copeland, Coller and Murin (2005) emphasize on the disadvantages of applying the method of discounting cash flow on stocks who note that discounting cash flow on stocks reveals less information about sources of value and is not so helpful in identifying new opportunities for creation the value. In addition, this method requires a significant amount of adjustments to bring the projected funding structure to the true value of the enterprise value.

Rosh (2008) emphasized on issues related to the use of the method of discounting cash flows. In particular, the author draws attention to the need to evaluation the level of professionalism and validity of the forecasts, it significance for the enterprise, the need to take into account the sectorial factors. The incorrect consideration of the sectorial factors can undermine the reliability of evaluation the enterprise value.

In the study of Evans and Bishop (2009) the peculiarities of applying the methods of income approach in mergers and acquisitions, practical problems the evaluation of joint stock companies were also reflected.

The practical application the method of discounting free cash flows for the enterprise, for equity capital and assets should give the same generalized indicators enterprise value. As noted by these methods give the same results in the following conditions:

- a) it market value is taken as the value of equity capital and debts;
- b) the growth rate of income is zero;
- c) the ratio between the enterprise's capital components must be constant throughout the period of evaluation (LEIFER; VOZHYK, 2004).

3. DATA AND METHODOLOGY

The methodological basis of the research is the systematic approach, which provided evaluation the system of accounting and analytical support of the PJSC "Iskra+". The system-structural method allowed forming a classification of evaluation approaches to the value of the PJSC "Iskra+". The analysis as a universal method of scientific knowledge



was used to carry out an analysis of the activity of the PJSC “Iskra+” in determining the market value of the enterprise.

Economic and statistical methods and expert assessments allowed to determine the degree of enterprise risk and the risk of inadequate valuation for adjusting the market value of the PJSC “Iskra+”. Methods of formalization and symbolic logic allowed to develop methodological principles of complex economic analysis of value indicators of PJSC “Iskra+”.

The information base of the research is the reports and official data of the state, regional statistics departments, official data of National Bank of Ukraine, financial, managerial, statistical and specialized reports of PJSC “Iskra+” for the period 2007-2017.

4. RESULTS AND DISCUSSIONS

4.1. The content of calculating the market value of the enterprise

In our opinion, conceptual changes in the order of determining the market value of the enterprise should ensure strict accuracy of the calculated indicators, its objectivity and economic justification.

Formation of the market value of the enterprise should be carried out in the system of accounting and analytical support of the enterprise and determined by the indicator of net assets, which should be adjusted to the anticipated level of profitability taking into account alternative risk-free investments and the level of risks of the enterprise’s activity.

We recommend calculating the market value of the enterprise according to the following formula:

$$V_t = \left(NAV_t + \sum_{i=1}^I \frac{E_t \left[\frac{NI_i}{NAV_i} - r_e \right] NAV_t}{(1 + r_e)^i} \right) \cdot R_t, \quad (1)$$

where V_t – market value of the enterprise at time (moment of determining the enterprise value);

NAV_t – net asset value adjusted at time (t);

E_t – expected estimated values based on anticipated data available at time (t);



NAV_i – the net asset value of in the expected period, taking into account the received profit;

N_{li} – net income in the expected period;

r_e – value of equity capital;

R_t –risk estimated at the time (t);

i – sub-index, which refers the indicators to the prediction period, $i = \overline{1, I}$,

I – prediction horizon.

The basis for the proposed calculation of the enterprise value is the net asset value (the difference between the value of assets and the value of liabilities). At the same time, the net assets value should be taken at the end of the reporting period (NAV_t) (as opposed to its value at the beginning of the period using the method EVA (NAV₀)) and should be adjusted in the accounting system and brought to its fair value. The determination of fair value is carried out separately for various types of noncurrent and current assets and liabilities using specific methods of cost, income and market approaches, depending on the type of assets and liabilities.

In determining the amount of additional profit that is provided by the synergistic interaction the components of intellectual capital, the indicators of discounted difference between the net profit and the value of equity should be used:

$$\sum_{i=1}^I \frac{E_t \left[\frac{NI_i}{NAV_i} - r_e \right] NAV_t}{(1+r_e)^i}, \quad (2)$$

The return on capital should be determined on the basis of the estimated value of net assets value in the expected period, taking into account the profit received in the previous period (NAV_i):

$$ROE_i = \frac{NI_i}{NAV_i} = \frac{NI_i}{NAV_{i-1} + \sum_{i=1}^I \frac{E_t \left[\frac{NI_{i-1}}{NAV_{i-1}} - r_e \right] NAV_t}{(1+r_e)^{i-1}}}, \quad (3)$$

where NAV_t – the net asset value adjusted at the end of the reporting period;

NAV_i – the net assets value in the expected period, taking into account the received profit;



NAVi-1 – the net assets value in the previous expected period;

Nli-1 – the net income received in the previous expected period.

The reliability of conducting settlements increases taking into account annual changes in equity due to the received financial result (net profit / loss).

The general indicator the market value of the enterprise should be adjusted to the level of risks of its activity. The determination of risk is based on the consideration of risk factors of the macro-, mezzo- and microenvironment. The assessment of these factors is ensured by the use of expert methods.

The proposed concept for determining the market value of the enterprise differs from existing approaches by the following provisions:

- a) the model of evaluation the enterprise value consists of three basic components: the value of net assets, the discounted difference between the projected net income and the alternative value of capital, the estimated risk of economic activity;
- b) the value of net assets should be taken at the end of the reporting period as fair value (as opposed to the value at the beginning of the period or the average annual value). The determination of fair value is carried out in the accounting system separately for various types of noncurrent and current assets and liabilities using specific methods of cost, income and market approaches depending on the type of assets and liabilities;
- c) the amount of additional income provided by the synergistic interaction the components of intellectual capital. It's determined as the discounted difference between the anticipated net profit and the alternative return on capital at the value of risk-free government bonds for 5 years of the expected year (as opposed to the full amount of actually received net profit, projected net profit and continued value);
- d) discounting is carried out at the value of capital, which is determined by the level of yield of domestic state bonds denominated in the national currency. It's reflects the lowest level of riskiness of investments (as opposed to the weighted average or industry average value of capital);
- e) the return on capital is determined on the basis of the estimated value of the net assets in the expected period, taking into account the discounted profit received in previous periods (as opposed to the actual profitability indicator).



4.2. The calculations of market value indicators of PJSC “Iskra+”

Detailed calculations of market value indicators and its adjustments were made for PJSC “Iskra+” (The name of enterprise is not specified, in order to maintain commercial secrecy).

PJSC “Iskra+” is one of the leading enterprises in the world for development, production, repair and service of aviation gas turbine engines for airplanes and helicopters. The enterprise is located in the southeast of Ukraine. For PJSC “Iskra+” as one of the basic enterprises of this research, the level of anticipated net profit, which will be received in 2018-2020, was carried out in three ways using the analytical alignment of the dynamic series based on the actual data on the net profit earned by PJSC “Iskra+” 2007-2017.

The choice of the form of function, reflecting the trend of changes in net profit indicators, was made taking into account the actual dynamics of the base indicator. The calculation was based on the linear, parabolic second order function and the method of adaptive modelling and prediction. The results of the analytical alignment the number of dynamics based on the linear dependence ($\check{Y} = a_0 + a_1t$) are presented in Table 1.

Table 1: Alignment of the net profit received by PJSC “Iskra+” in 2007-2017 (linear dependence)

Years	Actual net profit, thousands of UAH	Conditional symbol of periods, t_i	$y_i t_i$	t_i^2	Calculated net profit $\check{Y} = a_0 + a_1 t$, thousands of UAH	$(Y - \check{Y})^2$
2007	55955	-5	-279775	25	-227043,55	80088176729,39
2008	108605	-4	-434420	16	-109511,31	47574724291,44
2009	117619	-3	-352857	9	8020,93	12011737545,53
2010	53217	-2	-106434	4	125553,16	5232520569,63
2011	49384	-1	-49384	1	243085,40	37520232361,96
2012	37627	0	0	0	360617,64	104322951178,59
2013	207126	1	207126	1	478149,87	73453939588,09
2014	3843	2	7686	4	595682,11	350273531049,52
2015	741229	3	2223687	9	713214,35	784820869,30
2016	1248028	4	4992112	16	830746,58	174123781959,83
2017	1344161	5	6720805	25	948278,82	156722701881,12
Total	3966794	x	12928546	110	3966794,00	1042109118024,40

The calculation of the equation parameters was carried out with the least squares method using the system of normal equations:



$$\begin{cases} \sum_1^n y_i = a_0 n + a_1 \sum_1^n t_i; \\ \sum_1^n y_i t_i = a_0 \sum_1^n t_i + a_1 \sum_1^n t_i^2; \end{cases} \quad (4)$$

The defined indicators the equations of the straight line are: $a_0 = 360617,64$; $a_1 = 117532,24$. Accordingly, the linear equation describing the dynamics of obtaining net profit of PJSC “Iskra+”: $\tilde{Y} = 360617,64 + 117532,24 \cdot t$,

where t – serial number of periods or moments of time.

For PJSC “Iskra+” the anticipated net profit, which will be received in 2018-2022, according to linear dependence, are as follows (Table 2).

Table 2: The anticipated net profit received by PJSC “Iskra+” in 2018-2022 (linear dependence)

Year	The anticipated net profit, thousands of UAH
2018	1065811,05
2019	1183343,29
2020	1300875,53
2021	1418407,76
2022	1535940,00

The interval evaluation is also used, which are determined by trust intervals of the forecast when drawing up forecasts, apart from point values. The value of the trust intervals is determined as follows:

$$\hat{y} \pm t_{\alpha} \frac{S_y}{\sqrt{n}}, \quad (5)$$

where S_y – average square deviation from trend;

α – the tabular value of the t-criterion Student’s at the level of significance α .

$$S_y = \sqrt{\frac{\sum_1^n (y_i - y_t)^2}{n - m}}, \quad (6)$$

where y_i, y_t – the actual and calculated values the levels of the dynamic series;

n – number of levels in a series;

m – number of parameters in the trend equation.



Thus, it can be argued with a probability of 95 %, that in 2022 the net profit of PJSC “Iskra+” may not be less than 1326018,6 thousand UAH, but the net profit will not be higher than 1745861,3 thousand UAH.

The parabola of the second order ($\check{Y} = a_0 + a_1t + a_2t^2$) was used to confirm the correctness of the anticipated values also, taking into account that the absolute increments the net profit of PJSC “Iskra+” are not constant. The results of the analytical alignment of a series of dynamics for a parabolic dependence are presented in Table 3.

Table 3: Alignment of the net profit received by PJSC “Iskra+” in 2007-2017 (parabolic dependence)

Year	Actual net profit, thousands of UAH	Conditional symbol of periods t_i	t^2	$y_i t_i$	$y_i t_i^2$	t_i^4	Calculated net profit $\check{Y} = a_0 + a_1 t + a_2 t^2$ thousands of UAH	$(Y - \check{Y})^2$
2007	55955	-5	25	-279775	1398875	625	214485,65	25131967100,28
2008	108605	-4	16	-434420	1737680	256	67100,37	1722634375,29
2009	117619	-3	9	-352857	1058571	81	-21414,35	19330273092,81
2010	53217	-2	4	-106434	212868	16	-51058,51	10873382962,89
2011	49384	-1	1	-49384	49384	1	-21832,12	5071735389,28
2012	37627	0	0	0	0	0	66264,84	820125831,80
2013	207126	1	1	207126	207126	1	213232,36	37287574,38
2014	3843	2	4	7686	15372	16	419070,43	172413819263,22
2015	741229	3	9	2223687	6671061	81	683779,07	3300494947,14
2016	1248028	4	16	4992112	19968448	256	1007358,26	57921923684,35
2017	1344161	5	25	6720805	33604025	625	1389808,01	2083649885,84
Total	3966794	x	110	12928546	64923410	1958	3966794,00	298707294107,27

The calculation of the parameters of the equation is carried out using the system of normal equations:

$$\begin{cases} \sum_1^n y_i = a_0 n + a_2 \sum_1^n t_i^2 \\ \sum_1^n y_i t_i = a_1 \sum_1^n t_i^2 \\ \sum_1^n y_i t_i^2 = a_0 \sum_1^n t_i^2 + a_2 \sum_1^n t_i^4 \end{cases} \quad (7)$$

The specified equations of the line are: $a_0 = 66264,84$; $a_1 = 117532,24$; $a_2 = 29435,28$. Accordingly, the parabola equation, which characterizes the dynamics of obtaining net profit of PJSC “Iskra+”, is as follows:



$$\tilde{Y} = 66264,84 + 117532,24 \cdot t + 29435,28 \cdot t^2$$

The anticipated net profit for PJSC “Iskra+”, which will be received in 2018-2022, according to parabolic dependence, are as follows (Table 4).

Table 4: The anticipated net profit received by PJSC “Iskra+” in 2018-2022 (parabolic dependence)

Year	<i>The anticipated of net profit, thousands of UAH</i>
2018	1831128,33
2019	2331319,20
2020	2890380,63
2021	3508312,62
2022	4185115,17

Thus, according to the specified trust interval, it can be assumed with a probability of 95 % that in 2020 the net profit of PJSC “Iskra+” may not be less than 4072726,43 thousand UAH, but the net profit will not be higher than 4297503,92 thousand UAH.

Since the average square of deviations in the function of polynomials of the second order (193231,50) is less than the square of the deviations of the linear function (340279,15), the parabolic dependence ensures greater reliability of the received prediction series. At the same time, the parabolic dependence gives a high level of relative error of the performed calculations (53,58%).

Since the dynamics of net profit of PJSC “Iskra+” has significant fluctuations, which approximation cannot predict, and the dynamic series has a relatively small length. The methods of adaptive modelling and forecasting should be used to obtain more accurate predictive values.

The basis of adaptive methods is based on the model of exponential smoothing, the possibility of using it for forecasting was proved by R. Brown (EFIMOVA, PETROVA, RUMYANTSEV, 1998).

The analytical alignment of the dynamic series by the method of adaptive modelling and forecasting is presented in Table 5.



Table 5: Alignment of the net profit received by PJSC “Iskra+” in 2002-2011(adaptive modelling)

Years	Actual net profit, thousands of UAH	$S^1_t(y) = \alpha S_t(y) + (1-\alpha) \cdot S^1_{t-1}(y)$	$S^2_t(y) = \alpha S^1_t(y) + (1-\alpha) \cdot S^2_{t-1}(y)$	$a_0 = S^1_t(y) - S^2_t(y)$	$a_1 = \alpha / (1 - \alpha) \cdot (S^1_t(y) - S^2_t(y))$	Calculated net profit $\hat{Y} = a_0 + a_1$ thousands of UAH
1	2	3	4	5	6	7
2002	55955,00	x	x	x	x	x
1	2	3	4	5	6	7
2003	108605,00	132242,50	170532,46	93952,54	-8040,89	85911,65
2004	117619,00	115696,25	132147,11	99245,39	-3454,68	95790,71
2005	53217,00	117042,18	121573,66	112510,69	-951,61	111559,08
2006	49384,00	72364,55	87127,28	57601,82	-3100,17	54501,65
2007	37627,00	56278,17	65532,90	47023,43	-1943,49	45079,94
2008	207126,00	43222,35	49915,52	36529,18	-1405,56	35123,62
2009	3843,00	157954,90	125543,09	190366,72	6806,48	197173,20
2010	741229,00	50076,57	72716,53	27436,62	-4754,39	22682,23
2011	1248028,00	533883,27	395533,25	672233,29	29053,50	701286,80
2012	1344161,00	1033784,58	842309,18	1225259,98	40209,83	1265469,82
2013	1399420,29	1251048,07	1128426,41	1373669,74	25750,55	1399420,29
2014	1437121,67	1354908,63	1286963,96	1422853,29	14268,38	1437121,67
2015	1458012,01	1412457,76	1374809,62	1450105,90	7906,11	1458012,01
2016	1469587,34	1444345,73	1423484,90	1465206,57	4380,78	1469587,34
2017	1476001,24	1462014,86	1450455,87	1473573,85	2427,39	1476001,24

The smoothing factor is chosen based on the relative value of the actual data and is $\alpha = 0,7$. The exponential average k order is defined as follows:

$$S_t^{(k)}(y) = \alpha S_t^{(k-1)}(y) + (1 - \alpha) S_{t-1}^{(k)}(y) \tag{8}$$

The polynomials factor used for forecasting is determined by the aligned values of the series and for the linear model as follows:

$$\begin{cases} a_0 = 2S_t^{(1)}(y) - S_t^{(2)}(y) \\ a_1 = \frac{\alpha}{1 - \alpha} (S_t^{(1)}(y) - S_t^{(2)}(y)) \end{cases} \tag{9}$$

The obtained parameters using the analytical equalization for the direct was used to calculate the indicators of the system of equations. The obtained values of the parameters of the equation are: $a_0 = 360617,64$; $a_1 = 117532,24$. The model of R. Brown was used to obtain the values of fluid average indicators:

$$S_t^{(1)}(y) = \alpha y_t + (1 - \alpha) S_{t-1}^{(1)}(y)$$



$$S_t^{(2)}(y) = \alpha S_t^{(1)}(y) + (1 - \alpha) S_{t-1}^{(2)}(y) \quad (10)$$

The anticipated values of net profit for PJSC “Iskra+”, which will be received in 2018-2022, according to the methods of adaptive modeling and forecasting, accordingly taking into account the time value of information about the net profit received by PJSC “XXX” and unstable conditions the passage of economic processes, are as follows (Table 6).

Table 6: The anticipated net profit received by PJSC “Iskra+” in 2018-2022 (adaptive modelling)

Years	The anticipated of net profit, thousands of UAH
2018	1399420,29
2019	1437121,67
2020	1458012,01
2021	1469587,34
2022	1476001,24
Average annual net profit	1448028,51

In our opinion, the level of anticipated profit, obtained by adaptive modeling and forecasting methods, most adequately reflects the dynamics of changes in the indicator of net profit of PJSC “Iskra+” with a prevailing account of the trends of the last five years and is based on the calculations carried out in an unstable economic environment.

The obtained net profit values are taken into account in the model for determining the market value of the enterprise. The amount of anticipated net income is compared for each forecast year with the rate of return on alternative risk-free financial investments. This indicator is also used to calculate the level of return on capital.

Thus, taking into account the above calculations and proposals, the procedure for determining the market value of the enterprise for PJSC “Iskra+” will be the following (Table 7).

According to the proposed concept for determining the enterprise value, the calculation is based on the net assets value at its fair value plus a five-year excess of the anticipated discounted net profit over the level of return on alternative risk-free investments. The obtained value of the market value of the enterprise is adjusted to the level of activity risk taking into account factors of macro-, mezzo- and micro-environment.

The resulting market value of PJSC “Iskra+” as the amount of adjusted value of net assets at the end of the reporting period and the discounted difference between net profit



and cost of equity is UAH 6 566 225,58 thousand. The resulting market value should be adjusted to the degree risk of manifestation the factors of generation / destruction of value.

The evaluation of risk factors for adjusting the value of PJSC “Iskra+” with the use of an expert method involves the analysis of macro-, mezzo- and microeconomic factors (Table 8).

Accordingly, the general corrective indicator the risks of economic activity of PJSC “Iskra+” is -0.297 or -29.7%. Adjusting the market value of an enterprise, taking into account the risk activity indicator, allows obtaining an appropriate value for market value:

$$V_t = \left(NAV_t + \sum_{i=1}^T \frac{E_t \left[\frac{NI_i}{NAV_i} - r_e \right] NAV_t}{(1+r_e)^i} \right) \cdot R_t =$$

$$= (4\,356\,467,00 + 2\,209\,758,58) \cdot (1 - 0,297) = 6\,566\,225,58 \cdot (0,703) =$$

$$= 4\,616\,056,58 \text{ thousands of UAH}$$

The exclusion from the market value of the enterprise the net assets value, taking into account the above suggestions, allows you to determine the value of the intellectual capital:

$$IC = MV - NA \quad (11)$$

where MV – the market value of enterprise, thousand UAH;

NA – adjusted fair value of net assets of the enterprise, thousand UAH;

IC – calculated value of the intellectual capital of the enterprise, thousand UAH.

$$IC = MV - NA = 6\,566\,225,58 - 4\,356\,467,00 = 2\,209\,758,58 \text{ thousand UAH.}$$

The indicated difference in the market value of PJSC “Iskra+” and the net assets value reflects the unaccounted amount of intellectual capital in the composition of human capital, organizational capital and client capital.

These calculations confirm the hypothesis that the value of intellectual capital can be determined only in the aggregate of its components, since each of it determines the incurred expenses of different nature.



The calculation of the market value of PJSC “Iskra+” and the determination of the value of its intellectual capital is evidence of the implementation of an effective strategy for the development of the enterprise, taking into account the development of human capital, organizational capital and client capital.

5. CONCLUSIONS AND RECOMMENDATIONS

The proposed concept for determining the market value of the enterprise provides a reliable and reasoned calculation of value indicators based on the data of the accounting system for both profitable and unprofitable enterprises. The basis of the enterprise’s value is the net asset value at its fair value plus the five-year excess of the projected discounted net profit over the level of return on alternative risk-free investments. The determined market value of the enterprise is adjusted to the level of activity risk taking into account factors of macro-, mezzo- and micro-environment.

Conceptual differences in determining the market value of the enterprise from other approaches are:

- a) the use of the net assets indicator for its fair evaluation at the end of the reporting period (as opposed to the value at the beginning of the reporting period or the average annual value). The determination of fair value carried out in the accounting system for various types of noncurrent and current assets and liabilities using specific methods of cost, income and market approaches;
- b) the amount of additional profit provided by the synergetic interaction of the components of intellectual capital is determined as the discounted difference between the forecast net profit and the alternative return on capital for 5 years of the forecast year;
- c) the value of capital is determined by the level of yield of domestic state bonds denominated in the national currency, which reflects the lowest level of risk of investments;
- d) the return on equity is determined on the basis of the calculated net assets value in the forecast period, taking into account the financial results received in previous periods;



- e) the determined market value of the enterprise is adjusted to the level of activity risk taking into account factors of the macro-, mezzo- and micro-environment.

Table 7: The calculation of market value of PJSC “Iskra+”

Indicator	The order of calculation	Year					
		2017	2018	2019	2020	2021	2022
Net financial result: actual profit (loss), thousand UAH	The form No. 2, line 2350 (2355)	1344161,00	x	x	x	x	x
Net financial result: anticipated profit (loss), thousand UAH	adaptive modeling	x	1399420,29	1437121,67	1458012,01	1469587,34	1476001,24
Return on Capital (ROC), %	ROC = EBIT (1 – T) / (BE), where BE – book value of capital	30,85	32,12	28,20	25,95	24,45	23,36
Value of capital, %	according to official yield of domestic state bonds in 2018 ¹	x	12,94	12,94	12,94	12,94	12,94
Net asset value, thousand UAH	calculated value, determined at the end of the year, taking into account discounted financial results for the previous year	4356467,00	4356467,00	5096411,63	5617553,91	6011122,95	6319254,11
Discount rate, %	$(1+r_e)^t$, where r_e – value of capital, t – a sign of time	x	112,94	127,55	144,06	162,70	183,75
Discounted difference between net profit (loss) and value of capital, thousand UAH	$E_t \left[\frac{NI_i}{NAV_i} - r_e \right] \frac{NAV_t}{(1 + r_e)^i}$	x	739944,63	521142,28	393569,04	308131,16	246971,47

¹ [Yield of domestic state bonds in the primary market](https://bank.gov.ua/control/uk/allinfo) / National Bank of Ukraine // Official online representation. Access : <https://bank.gov.ua/control/uk/allinfo>.



Table 8: The evaluation of risk factors for adjusting the market value of PJSC “Iskra+”

No.	Groups and types of factors	Significance of factor	Evaluation of experts										Average Evaluation	Adjustment Factor
			internal experts							external experts				
			Financial Director	Director of Production	Director of Corporate Rights and Investment Projects	Marketing Director	Technical Director	Director of Quality	Director of Human Resources Management	Analyst of Rating Agency	Head of analytical department of the bank	Professional Appraiser of Consulting Company		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MACRO-ENVIRONMENT FACTORS														
1	State support of the aircraft industry (until 2022)	0,06	0,01	0,01	0,02	0,02	0,01	0,01	0,01	0,04	0,02	0,03	0,02	0,001
2	Uncertainty of the regulatory environment, contradictory legislation	0,08	-0,24	-0,22	-0,22	-0,25	-0,21	-0,20	-0,20	-0,23	-0,22	-0,26	-0,23	-0,018
3	Reduction of investment activity in the country	0,15	-0,45	-0,42	-0,48	-0,49	-0,41	-0,40	-0,48	-0,44	-0,46	-0,44	-0,45	-0,067
4	Inflation loss cost the value of capital	0,05	-0,12	-0,11	-0,13	-0,11	-0,12	-0,11	-0,11	-0,12	-0,12	-0,13	-0,12	-0,006
5	Fluctuations of exchange rates	0,09	0,01	0,01	0,02	0,01	0,01	0,01	0,01	0,02	0,03	0,02	0,02	0,001
6	Budget financing of activity	0,04	0,02	0,03	0,01	0,01	0,02	0,01	0,01	0,01	0,01	0,01	0,01	0,001
MEZZO-ENVIRONMENT FACTORS (heavy industry – machine building)														
7	Ability to lose consumers due to low demand for products in the domestic market	0,16	-0,61	-0,60	-0,61	-0,68	-0,66	-0,68	-0,65	-0,61	-0,62	-0,64	-0,64	-0,102
8	Orientation of sales to international markets	0,11	-0,46	-0,47	-0,51	-0,50	-0,47	-0,48	-0,46	-0,51	-0,52	-0,53	-0,49	-0,054
9	High level of industry competition in international markets	0,06	-0,75	-0,77	-0,76	-0,77	-0,72	-0,70	-0,71	-0,70	-0,72	-0,74	-0,73	-0,044
10	The complexity of the industry and the increased requirements for the	0,03	-0,03	-0,05	-0,02	-0,01	-0,02	-0,04	-0,03	-0,02	-0,01	-0,03	-0,03	-0,001



	qualification of the workforce													
MICRO-ENVIRONMENT FACTORS														
11	Availability of cooperation with international companies	0,06	-0,05	-0,03	-0,05	-0,06	-0,02	-0,04	-0,02	-0,02	-0,03	-0,04	-0,04	-0,002
12	Use of credit resources	0,01	-0,01	-0,01	-0,02	-0,01	-0,01	-0,01	-0,01	-0,01	-0,03	-0,02	-0,01	0,000
13	Compliance production with quality standards	0,07	0,01	0,02	0,01	0,01	0,02	0,02	0,01	0,02	0,01	0,02	0,02	0,001
14	Investment losses when investing in corporate securities of enterprise	0,01	-0,01	-0,01	-0,02	-0,01	-0,01	-0,01	-0,01	-0,02	-0,02	-0,01	-0,01	0,000
15	Liquidity losses as a result of the impossibility to selling assets due to deterioration of market conditions	0,02	-0,32	-0,34	-0,30	-0,38	-0,36	-0,36	-0,34	-0,31	-0,36	-0,38	-0,35	-0,007
	The general indicator the risk of evaluation the value of the enterprise	-0,297												



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