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MODELS FOR ACCOUNTING BUSINESS ANALYSIS OF THE RISK AND FINANCIAL STABILITY OF COMPANIES

Annotation. *The report addresses issues related to the methodology and organization of the accounting business analysis of companies. Specific models are presented, incl. for integration of accounting business analysis into a Balanced Sorecard system. Special attention has been given to models for analysing of financial stability of companies and for assessment of risk of insolvency. The integration of Accounting Business Analysis into balanced system of indicators creates preconditions for effective management of the companies'strategy and tactics.*

Key words: *accounting analysis, balanced system, risk, insolvency.*
JEL code: *M 40.*

1. Introduction

Accounting business analysis (ABA) is a specific function of management, methodology and science. In functional terms, the ABA is inherent in the main business functions of management: budgeting, reporting, control, motivation and regulation. The scientometric framework of the SAA is based on the parameters: subject, object and method. The subject of the ABA of the enterprise are the microeconomic, financial, accounting and internal processes related to the transformations of capital in the phases of marketing, investment, operational, commercial and financial activities of the enterprise. The object of the ABA are the microeconomic processes (economic activity) in connection with the assets, capital and capacity of the enterprise.

The ABA method, in epistemological aspect, is the system of methods positioned between the scientific subject and the object. The ABA method is based on epistemological principles – analysis, synthesis, induction, deduction and translation. The dynamic, risky and competitive market environment presupposes the development of different types and subsystems of the ABA: preliminary, operational, current, subsequent and situational analysis. Pointed types of business accounting analysis are integrated in horizontal, vertical and integral aspects.

The indicators of ABA are analyzed according to the criterion for optimal information capacity and content. The key indicators and business indicators have different information content in different moments of the logistics cycle of the business processes and activity of the enterprise. A significant part of the indicators generate optimal information content after a complete accounting – information cycle over time.

The methodology and organization of the ABA is based on a systematic, balanced, technical and economic, accounting and financial approaches. The Balanced Scorecard implies the integration of financial and non-financial business indicators in four key perspectives (Table 1).

Table 1

Balanced Scorecard

Perspectives and subsystems of the Balanced scorecard	Key indicators
Financial and accounting processes	Analysis of financial strategy, financial condition, stability and risk.
Market, marketing and customers	Analysis of marketing strategy and competitiveness.
Internal processes and business environment	Analysis of delivery, operational, sales, innovation and information processes.
Innovation, training and development	Analysis of human capital

The integration of the ABA and Balanced Scorecard of indicators in a concentric model (Fig. 1) allows more effective strategy and tactics management in companies.

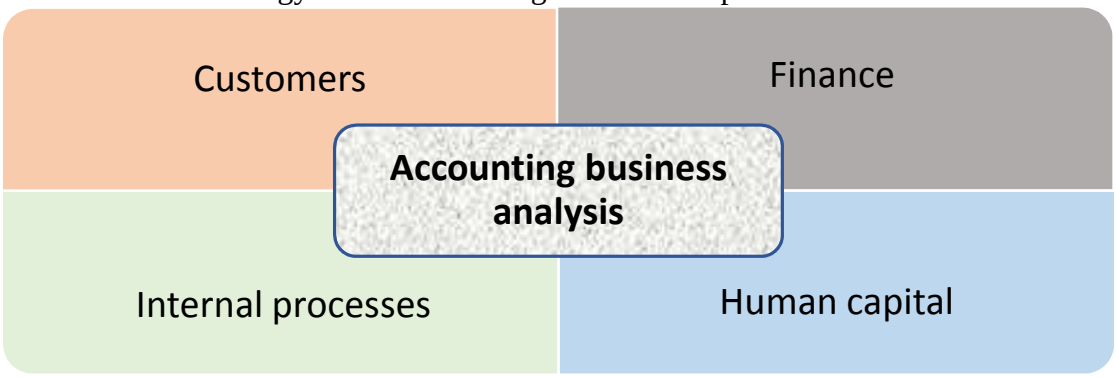

Fig. 1. ABA within Balanced Scorecard of indicators

2. Perspectives for improving the ABA methodology through anti-crisis accounting analysis

The ABA methodology must comply with the following basic principles:

1. Conformity with the specifics, the logistic cycle and the peculiarities of the economic activity of the company. Integration between the types and subsystems of ABA – preliminary, operational, current, subsequent and situational analysis;
2. Compliance with the specifics of the market. Distinction of strengths, weaknesses, opportunities, threats – emplacement the company in the market space;
3. Adjustment in accordance with the profit, profitability, financial stability and risk components.

The accounting analysis of the risk of company destabilization and insolvency is performed using the following main methodic models:

- Model “Z-Score Analysis” and “ZETA-Analysis” of Edward Altman.
- Models "Z-Score Methods" by Fulmer, Springate, Taffler, Lis and others.

According to the basic model of Edward Altman the analysis and assessment of the risk of destabilization is based on several groups of indicators:

Liquidity Ratios

1. Absolute liquidity ratio

$$Rt(al) = \frac{\text{Cash } + \text{ Short– term financial investments}}{\text{Current liabilities}}$$

Critical range (0.2 – 0.5)

2. Rapid liquidity ratio (Acid test ratio, Quick ratio) (Acid test ratio, Quick ratio)

$$Rt(rl) = \frac{\text{Cash } + \text{ Short– term financial investments} + \text{Receivables}}{\text{Current liabilities}}$$

Critical range (0.3 – 1.0)

3. Current liquidity ratio (Current Ratio)

$$Rt(cl) = \frac{\text{Current assets}}{\text{Current liabilities}}$$

Critical range (1.0 – 2.0)

4. Net working capital

$$Net(wc) = \text{Current assets} - \text{Current liabilities}$$

Critical range: (> 0)

Capital structure indicators (Gearing ratios /Financial stability ratios)

5. Indicator of financial independence

$$I(fi) = \frac{\text{Equity}}{\text{Total assets}}$$

Critical range: (0.5 – 0.8)

6. Total liabilities to total assets (Total debt to total assets)

$$Tlb\_ta = \frac{\text{Liabilities}}{\text{Assets}}$$

Critical range: (0.2 – 0.5)

7. **Long-term debt to total assets**

$$Lt\_ass = \frac{\text{Long} - \text{term debt}}{\text{Total assets}}$$

8. **Total debt to equity**

$$Rt(td\_eq) = \frac{\text{Total debt}}{\text{Equity}}$$

Critical range: (0.25 – 1.0)

9. **Long-term debt to fixed assets**

$$Ild\_fa = \frac{\text{Long} - \text{term debt}}{\text{Fixed assets}}$$

10. **Indicator of coverage of interest on loans (Times interest earned)**

$$Itie = \frac{\text{Earnings Before Interest and Taxes (EBIT)}}{\text{Interest expenses on loans}}$$

Critical range:(> 1)

Profitability ratios

11. **Profitability of sales (Return on sales)**

$$Irs = \frac{\text{Net Profit}}{\text{Net Sales}}$$

12. **Return on equity ratio (Return on shareholders' equity)**

$$Irer = \frac{\text{Net Profit}}{\text{Equity}}$$

13. **Return on current assets**

$$R(cass) = \frac{\text{Net Profit}}{\text{Current Assets}}$$

14. **Return on fixed assets**

$$R(fass) = \frac{\text{Net Profit}}{\text{Fixed assets}}$$

15. **Return on investments**

$$R(inv) = \frac{\text{Net Profit}}{\text{Equity} + \text{Long Term Debts}}$$

16. **Networking capital turnover**

$$Nct = \frac{\text{Net Sales}}{\text{Net Turnover Capital}}$$

Edward Altman methodology has been improved in order to achieve high sensitivity and extend the relevance of forecasts. The following functional dependence is used:

$$Z = 0.012X_1 + 0.014X_2\ 0.033X_3 + 0.006X_4 + 0.999X_5$$

where: X_1 – ratio of own current assets to the total amount of assets;

X_2 – ratio of retained earnings to total assets;

X_3 – ratio of gross profit, before taxes, fees and interest (EBIT) to total assets;

X_4 – relation of the market value of the ordinary preferred shares (financial assets) to the book value of the attracted capital (Total Debts);

X_5 – ratio of net sales to total assets.

Edward Altman's Z-function in its modified version is as follows:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + X_5$$

Companies with "Z-Score" parameters equal to or higher than 2.99 are considered as "financially stable", and companies whose "Z-Score" parameters are less than 1.81, are characterized by a high degree of risk of bankruptcy (so-called "financial collapse").

An optimal point of at least 2.675 has been adopted.

The British scientist Lis proposes an alternative functional model for discriminant analysis of the risk of bankruptcy:

$$ZL = 0.063X_1 + 0.092X_2 + 0.057X_3 + 0.001X_4$$

where: X_1 – working capital / total assets;
X_2 – profit from sales / total assets;
X_3 – retained earnings / total assets;
X_4 – equity / borrowed capital.

The discriminant model for risk analysis proposed by Fulmer is expressed through the following functional dependence:

$$ZF = 5.528X_1 + 0.212X_2 + 0.073X_3 + 1.270X_4 - 0.120X_5 + 2.335X_6 + 0.575X_7 + 1.083X_8 + 0.894X_9 - 3.075$$

where: X_1 – retained earnings from previous years / total assets;
X_2 – net sales revenue / total assets;
X_3 – gross profit / equity;
X_4 – cash flow / liabilities – total;
X_5 – long-term liabilities / total assets;
X_6 – short-term liabilities / total assets;
X_7 – log (current tangible assets);
X_8 – working capital / amount of liabilities;
X_9 – log [(gross profit "EBIT" + taxes and fees) / (taxes and fees)];

Gordon Springgate offers a model for analyzing, assessing and forecasting the risk of company's financial insolvency:

$$ZS = 1.03X_1 + 3.07X_2 + 0.66X_3 + 0.4X_4$$

where: X_1 – working capital / total assets;
X_2 – (gross profit + taxes and fees) / total assets;
X_3 – gross profit / short-term liabilities;
X_4 – net sales revenue / total assets.

At values: *ZS* <0,862, the company will suffer a financial collapse with a high degree of probability. The Springgate financial insolvency forecast has a guaranteed rate of 92.5% within one year.

British scientists R. Taffler and G. Tishaw offer a mathematical interpretation of Edward Altman's model through a four-factor functional model:

$$ZT = 0.53X_1 + 0.13X_2 + 0.18X_3 + 0.16X_4$$

where: X_1 – profit from sales / short-term liabilities;
X_2 – current assets / liabilities;
X_3 – short-term liabilities / amount of assets;
4_4 – net sales revenue / amount of assets.

The presented models for analysis and assessment of the risk of insolvency (bankruptcy) can be reduced to following general form:

$$GF\ model = a_0 + \sum_{i=1}^{n}(a_i * f_i)$$

where: a_0 , a_i – regression coefficients
f_i – factors determining the financial stability of the company.

The methodology for risk analysis of destabilization and insolvency should be positioned in the "Finance" perspective of the АБА in the Balanced scorecard (Fig. 1). The results of the discriminatory analysis of the risk of destabilization and insolvency should be interpreted in relation to the results of the overall activity of the companies.

3. Conclusion

The proposed concentric model of Accounting business analysis in a the Balanced scorecard of indicators (Fig. 1) allows for more effective management of companies. Modern realities pose challenges to the prognostic accounting analysis of financial stability and risk, which can be addressed with

improvements in methodological and applied aspects. The integration of accounting business snslysis into balanced system of indicators creates preconditions for effective management of the companies'strategy and tactics. Modern models for accounting business analysis pose certain challenges to the systems for accounting and integrated reporting of enterprises and companies.

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