PREDICTION OF FINANCIAL DISTRESS BASED ON ACCOUNTING INFORMATION

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Abstract: *When a company goes through a period of economic uncertainty, and its ability to keep operating in the foreseeable is called into question, all stakeholders are affected. In terms of economics a failure means that a company can't respect the economic principle of going concern, in some situations reaching insolvency or even bankruptcy. The research objective is identifying the key elements regarding the going concern of the companies' activity, and the accounting aspects which are contributing to the analysis of the level of risk faced by a company. According to the accounting rules, the management of the entities bears the responsibility for the preparation of financial statements in accordance with this principle. The hypothesis from which this research starts is that the models of discriminative analysis are the only way to verify the going concern assessment for a long-term period. Following the research, the factors that contribute to the assessment of the principle of going concern were identified, as well as an example of discriminative analysis to assess the risk of bankruptcy that an entity may face, or not in the foreseeable future. The research is based on going concern assessment, but also regarding the usefulness of data collection for business development. At the same time, a series of threats regarding the decision-making processes are pointed out, which may affect the activities of companies. The potential contribution of the study is to develop the literature on a current topic that should be a constant concern of companies, and it can highlight the usefulness of discriminative analysis to predict the financial distress a company may face.*

Keywords: going concern; financial difficulty; accounting; risk; uncertainty.

JEL Classification: M40; M41.

1. Introduction

The reactions of investors who requested an increased utility of the presented information in the decision-making process, determined substantial modifications in financial reporting. These modifications are the effect of the emerging economic procedures and progressive changes in contemporary accounting. It is quite hard for professionals to give up various techniques and principles previously used for decades, which is a sign of conservatism. On the other hand, the, the principle of

prudence is what makes them doubt whether the new solutions will generate the desired outcomes and if the data presented in the financial statements is going to be more relevant and correct (Wójcik-Jurkiewicz, Jurkiewicz, 2014).
The going concern assumption for a long-term perspective can be tested by using a series of models of discriminative analysis. Accountancy has a series of principles regarding the preparation of financial statements including this ongoing concern statement. To demonstrate this hypothesis, mentioned above, this research must answer the following questions:

- Does the going concern have any threats?
- Do the financial reports contain information regarding this principle?
- The discriminative analysis proves to be useful when evaluating any threats to the going concern?

There are a series of rules that must be considered when it comes to preparing and presenting the financial statements to the stakeholders. At the same time, one of the most important concepts in accordance with which the financial statements must be prepared is the concept of going concern. Going concern is defined as being the "assertion that an entity will not cease its activity but keep operating in the foreseeable future or at least until the subsequent reporting period".
It also considers the company's potential to produce the necessary resources to stay on the market and to avoid bankruptcy or insolvency. As Zéman and lentner (2018) are pointing out, the principle of going concern is realised to assure "an indefinite and uninterrupted sequence of transactions" and has a key contribution in the preparation of financial statements. In accordance with Hammond, Opoku and Kwakwa (2022), these statements reveal the idea that financial estimation and evaluation of the elements of assets and liabilities on the one hand and income and expenses, on the one hand, are affected by the principle of going concern. Also, the financial statements prepared based on this principle offer users the assurance that the company will continue its existence on the market soon, continuing to fulfil its objectives and aspirations. The idea of going concern of a company's activity is an essential criterion that investors consider when analysing the feasibility of investing in a company, especially because they know some financial failures that happened on the market, for example the case of Enron, WorldCom, Global Crossing Ltd., Kmart Corp. and other. So, the trust of the investors, in a company, is more solid if they have the going concern assessment guaranteed.
To answers for the above-mentioned questions, the paper contains a case-study based on the financial statements of a Romanian listed company, ALRO S.A., for the reporting period 2012-2022, which's data was used for a discriminative analysis, based on three well-known models.

2. Forecasting models for business failures

Most of companies are established intending to stay on the market for an indefinite period. The accounting assessment of going concern is a presumption that the company will manage its activity long enough to be able to pay off their obligations. When establishing the going concern assessment, the management of the company must take into consideration all data to which it has access in the moment of preparing the financial statements.

In accordance with Wójcik-Jurkiewicz and Karczewska (2019) when conducting an evaluation to recognize if a company has any symptoms of threats regarding the going concern, there are multiple methods that can be applied. These methods are classified according to some essential criteria, which will be presented in the following.

The first criterion relates to the nature of the factors based on which the solvency of a company is determined. Thus, the following methods are distinguished: quantitative, qualitative, and mixed. The quantitative method is analysing only measurable data. In the qualitative analyses, immeasurable data are considered, like the opinion of sellers, managers, experts, surveys on consumer objectives (Dittmann, 2008). The third method is using information from both qualitative and quantitative methods, so it is a mixed approach.

The other criterion refers to the possibilities of predicting the risk level regarding the solvency reduced. These techniques are established on logical and deductive argument and empirical deduction. Logical and deductive methods assume that the assessment of a company's solvency is carried out based on the analysis of some information that reflect the company' financial statement. Empirical methods of induction include mathematical and statistical analysis facilitating the comparison between companies, more than in the case of methods based on logic and deductive reasoning. The discriminative analysis is part of the empirical deduction models (the evaluation is carried out on certain reports, the choice of which is made following empirical research).

Several studies were made to develop models that can predict the business failures (Desai et al., 2020; Puspaningsih and Analia, 2020). These models were grouped in three large groups: statistical methods, soft computing methods, and theoretical methods, presented in Table 1. Over time, to predict the going concern assessment various models have emerged.

Table 1: The classification of bankruptcy forecasting models

Statistical methods	Methods of soft computing (artificial intelligence)	Theoretical methods
Discriminative analysis models Logit Models Probit models Decision trees Altman's Z-score Bankometer	Artificial neuron network Fuzzy logic Support vector models Genetic algorithms Comprise data mining Data envelopment analysis (DEA)	Entropy theory models Hazard models Credit risk models (CreditMetrics, KMV, CreditPortfolio)

Source: own work based on (Wójcik-Jurkiewicz and Karczewska, 2019) and (Hammond, Opoku and Kwakwa, 2022)

Balcaen and Ooghe (2006) evaluated 43 predictors which were grouped in 4 categories: "1 univariate model, 2 models with risk indices; 21 multiple discriminant analysis models and 19 conditional probability models". Also, Kumar and Ravi (2007), studied 128 statistical and soft computing models to predict the risk of

bankruptcy, focusing on the methods used in various models. Jackson and Wood (2013) discovered 5 commonly used methods as “logit, univariate, multiple discriminant analysis, neural network, and contingent statements”. Nevertheless, the ongoing concern predictors studied by now have different levels of precision. And because of this, more research can be made to find various ways of prediction and new models.

Altman (2023) is one of the most famous authors with published research in the field of predicting company bankruptcy, thus he considered that the most used variables for determining the continuity of activity include indicators such as "profitability, liquidity, leverage, solvency, activity and governance variables corporate, varying from one researcher to another in terms of weight and importance". Each researcher uses many variables in his study. The dominant variables are different and can’t be fully fixed in a certain set and order. The relative significance of the factors doesn’t exist. Thus, it is necessary to analyse and establish the critical independent variables and to be classified in the order of priorities.

The benefit of discriminative models is that they use traditional ratio analysis with econometrics. Moreover, because the results obtained are easy to interpret and the structure is not complicated, the discriminative analysis is the most used method when it comes to detect the risk of insolvency or bankruptcy, worldwide (Holda, 2006).

The going concern assessment faced many threats, which are presented widely in International Standard on Auditing 570. The factors which influence a company can be classified in accordance with many criteria, but the international regulation is distinguishing three main categories when talking about threats: financial, operating and non-financial.

The international regulation highlights only a few situations by way of example, but this does not mean with certainty that the occurrence of these situations will trigger considerable uncertainty. Examples of factors that may lead to doubts about the potential of an entity to continue its activity are presented in Table 2.

Table 2. Factors threatening the going concern assessment.

Classification	Examples
Financial factors	• Fixed-term loans that reach maturity without presenting real repayment possibilities. • The constant need to obtain short-term loans in order to finance long-term assets. • Signs of cessation of financing from some debtors or various creditors. • Operating cash flows with negative values reflected by previous or expected financial statements. • Key financial indicators with negative values. • Significant operating losses or substantial impairment of assets expected to generate cash flows. • The impossibility of paying creditors at the established due date.

	• The impossibility of respecting the terms stipulated in the loan contracts. • The transition from relationships based on commercial credit, to transactions with cash on delivery, in relation to suppliers.
Operating factors	• Loss of an important market, principal supplier license, or others factors. • Work troubles or lack of principal or key goods. • The emergence on the market of another and stronger competitor.
Non-financial factors	• Impossibility of compliance with capital requirements or statutory requirements. • Legislative or government policy changes that are anticipated to have negative effects on the going concern assessment. • Absence of reasonable insurance in the event of a disaster.

Source: own work based on (Wójcik-Jurkiewicz and Karczewska, 2019)

3. ALRO S.A. Case study

Discriminant analysis models serve as a means of assessing company's potential to continue its activity in the foreseeable future. ALRO S.A. is a public company listed on BVB (Bucharest Stock Exchange).
In the empirical research of the study, the financial statements of ALRO S.A. were analysed for 10 years, respectively 2012-2022. Thus, three bankruptcy forecasting methods, developed by Hadasik (1998), Gajdka and Stos (1996) and Hamrol and Chodakowski (2008), were applied. The models are detailed in Table 3.

The company was founded in 1961, in Romania it is included in a vertically integrated group, being an aluminium producer, carrying out the entire process, from the extraction of bauxite to obtaining the processed products. I chose this company because after studying the companies listed on the Bucharest Stock Exchange, very few proved to have problems related to the going concern assessment or to face financial distress, and among those identified, I considered ALRO S.A. to be the most relevant, because it is a large company that can make a significant contribution to GDP formation. So that, a possible bankruptcy of it, would significantly impact the market and the industry of which it is a part.
The models described above are in the form of discriminative functions. The critical point for the model of Gajdka and Stos (1996), is set at the level of 0.45, this reflects the idea that if a company generates a result greater than 0.45, its situation is positive, and it is not facing a risk of insolvency or bankruptcy.

Table 3. Models used to determine the values for the models selected for the determination of bankruptcy risk.

Model	Description
Hadasik (1998)	**D(W)** = 0,365425W1 – 0,765526W2 – 2,40435W5 + 1,59079W7 + 0,00230258W9 + 0,0127826W12 + 2,36261
	W1 – current assets / current liabilities W2 – (current assets – inventory) / current liabilities W5 – liabilities / assets W7 – working capital / liabilities W9 – receivables * 365 days / sales revenue W12 – inventory * 365 days / sales revenue
	Critical point: 0,0
Gajdka and Stos (1996)	**Z**=0,7732059 - 0,0856425X1 + 0,0007747X2 + 0,9220985X3 + 0,6535995X4 - 0,594687X5
	X1 – sales revenue / average annual total assets X2 – average annual see: short-term * 360 /cost of manufacture of product sold X3 – net profit / average annual total assets X4 – gross profit / net sales revenue X5 – total liabilities / net assets
	Critical point:0,45
Hamrol and Chodakowski (2008)	**Z**=3,562X1 + **1**,588X2+4,288X3 + 6,719X4 - 2,368
	X1 – net financial result / total assets X2 - (current assets - inventory) / short-term liabilities X3 – fixed capital / total assets *X4 – financial results from sales /sales revenue*
	Critical point: 0,0

Source: own work based on Wójcik-Jurkiewicz and Karczewska (2019)

On the other hand, if the value of the result is below the threshold of 0.45, the company faces an unfavorable situation, having a high bankruptcy tax. In the Hadasik (1998) and Hamrol and Chodakowski (2008) models the critical point is set to 0.00. The results generated by the models above, according to the data of ALRO S.A. are presented in Table 4.

Table 4. The results of application the models for the period 2012-2022

Model	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Hadasik (1998)	2,53	2,83	2,36	2,30	2,14	2,34	2,26	2,27	2,19	2,50	2,41
Gajdka and Stos (1996)	-0,01	-0,05	-0,34	-0,23	-0,23	0,31	-0,05	-0,70	-0,06	-0,19	-0,12
Hamrol and Chodakowski (2008)	7,95	7,56	7,30	7,78	7,30	8,85	7,81	7,32	10,18	7,84	8,80

Source: own work based on data from EMIS database (ALRO S.A. financial statements)

According to the financial results of ALRO S.A. reflected in the table above, and in relation with the critical point of Gajdka and Stos's model, it can be deduced that the realised results in 2012 - 2018 reflect clear warnings of an approaching bankruptcy as the values were under the critical point of 0,45. As of 2019, the board of the entity began to put in action diverse solutions pursuing to improve the liquidity, so the value increased to 0.70, but, despite expectations, in the further years, the values decreased below the critical point, again. So according to this model of discriminative function, the company faces a great risk of bankruptcy.
This risk is also reflected by the results acquired through the Hadasik model. The values of the analysed period were around 2, a value near to the critical point. Because of this, the capacity of the company to continue its operations in the foreseeable future is uncertain. The discriminative function in the M. Harmol model crosses the critical point in the analysed period, oscillating around 7, so according to this model, there is no risk of bankruptcy. The most positive outlook regarding going concern assessment, can be observed in 2020, the ratio for this year being at the level of 10.18. In the next years, the ratio fell again. As a conclusion, compared to all three models considered, it can be said that the entity is still facing a risk of financial distress, and the principle of going concern is under threat.

Conclusions

The continuous existence of companies has a major importance for all stakeholders. Researchers continue to develop models for predicting company holdings with a high level of accuracy, but their effectiveness depends on the input data. So, finding the proper variables to reach the intended result, is very important. The accountancy is a tool with which a company can be evaluated and settled in the business environment.
The discriminative analysis is a useful tool when evaluating the principle of going concern and to increase the validity of the economic turnover. This method facilitates the detection of any bankruptcy risk threats in time to enable management to implement actions to improve the company's activities.
Financial analysis is useful for auditors to evaluate the financial situation and highlight potential threats related to the company's economic-financial operations. Based on Micherda and Stępień (2016) 'the traditional ratio analyses do not provide uniform results and conclusions even when continued concern is threatened". Thus, discriminant analysis methods facilitate the process of the financial statements' evaluation and the company's ability to continue the activity in normal conditions.
The aspects highlighted in this research contribute to the validation of the research hypothesis mentioned at the beginning of the paper. On cognitive and practical considerations, the discriminatory models were selected for the purpose of evaluating an entity from the point of view of a long-term going concern assessment. This research applied discriminative analysis methods, based on the data of a company from the industrial sector, and it resulted the placement of the company in a threat zone from the point of view of the risk of facing financial difficulties.
Among the paper limitation is the study sample reduced to a single company, a fact that makes it impossible to extrapolate the research results for the entire activity

sector of the analysed entity. But this limitation opens the possibility of future research, based on larger samples and from various fields of activity.

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