

Assessment of the going concern value of a business entity by means of selected discriminative models

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Abstract —The issue of evaluation of a business as an ongoing concern is frequently explored in accounting science and practice. Despite this fact, however, the authors managed to identify an interesting research gap i.e. the possibility to apply discriminative analysis to detect threats for the ongoing concern. The research hypothesis assumed and defended by the authors is that the ongoing concern principle on long term basis can only be verified by means of discriminative analysis models. For the purposes of the paper the authors applied the following research methods: the analysis method, the deduction method, the analysis of literature on the subject matter as well as national and international regulations. As the result of the conducted research, the authors identified factors for evaluation of ongoing concern and presented sample applications of discriminative analysis for assessing the chances of businesses to operate in the future. The paper is of cognitive and practical nature especially with respect to the ongoing concern and to the usefulness of collected data for development of businesses. Additionally, the authors point to vital threats that may impact the decision taking processes regarding continuation of business activity.

Index terms — generally accepted accounting principles, the ongoing-concern principle, threats to the ongoing concern, models of discriminative analysis

I. INTRODUCTION

The feedback from investors who called for enhanced usefulness of the reported information in the decision making processes, brought about vital changes in financial reporting. The changes were the consequence of newly emerged economic processes and evolutionary transformations of contemporary accountancy. In the era of globalization, the pace of the transformations is really fast which triggers a number of uncertainties concerning validity of the changes as well as their

scale and scope. It is ever so difficult to part with tried and tested solutions which have been in use for decades. On one hand, sticking to what is known is a sign of conservatism, on the other, it is sheer prudence that makes people wonder whether new solutions will bring the expected results and benefits, and whether the information coming from the financial reports will be more true and fair (Wójcik-Jurkiewicz, Jurkiewicz, 2014).

The research hypothesis that the authors adopted in the present paper is a statement that the ongoing concern assumption in the long term perspective can be verified by applying models of discriminative analysis. The background of this hypothesis is the overall objective of accountancy i.e. the preparation of financial statements based on generally accepted accounting principles. In order to prove that the above mentioned hypothesis is correct, the authors had to find answers to the following questions:

- Are there any threats to the ongoing concern?
- Do the financial reports include information on threats to the ongoing concern?
- Does the company conduct ratio analysis?
- Are the discriminative analysis models useful for the evaluation of threats to the ongoing concern?

In order to provide answers to the above questions, the authors analysed financial reports of a public company PBG S.A. for the reporting period 2010-2017, pointing at the same time to the research gap concerning the optimum tools for evaluation of threats for the ongoing concern in the long term perspective.



II. ONGOING CONCERN IN DOMESTIC AND INTERNATIONAL REGULATIONS

The majority of business entities are established with the intention to be operational in an indefinite period of time. Some of them, however, are only founded for the purposes of one specific undertaking which, nevertheless, is not a common phenomenon. In principle, business entities operate on the market in an unrestricted time frame. If in the business practice one speaks of the ongoing concern principle, this usually refers to continuation of operations in the foreseeable future e.g. at least until the subsequent reporting period. The underlying principle of the ongoing concern is an assumption that the entity is going to conduct operations long enough to be able to settle its liabilities. This assumption is vital for the management of resources, liabilities and operations as it impacts future forecasts of the entity. Carrying out operations lies in the interest of all stakeholders such as owners, employees and suppliers, it is even in the interest of the state. For the owners ongoing concern is essential as it generates profits from the invested capital; for the employees it guarantees a stable income, for suppliers demand and for the state revenue from tax (Kumor, 2016). Detailed analysis of the balance sheet law (the Accounting Act) and guidelines of IAS, IFRS and ISA shows that despite different approaches towards the ongoing concern principle encountered in these regulations (Szczepankiewicz, 2013), its interpretation is convergent. The essence of the regulatory approach towards the ongoing concern principle is presented in Table 1.

As stipulated in the Accounting Act, while adhering to certain rules and the accounting policy, it is possible to assume that a business entity will continue operations in a foreseeable future, in a relatively unchanged scope of activity, and will not be subject to bankruptcy or liquidation proceedings. While determining the ongoing concern, the head of the entity must take into account all information available on the day of preparing the financial statement. The ongoing concern assessment must be valid for the period of at least one year from the balance sheet date (the Accounting Act, Article 5 point 20). Similar regulations can also be found in the International Financial Reporting Standards (IFRS1 §23). The issue of ongoing concern is also regulated in the International Standard on Auditing 570. Under the going concern assumption, an entity is viewed as continuing in business for the foreseeable future, however, the specific time frame of the foreseeable future is not indicated (ISA 570, 2009). If the ongoing concern is assumed, the entity is required to prepare a financial statement. If the management plans to liquidate the entity or to cease trading or has no realistic alternative but to do so, the preparation of a financial statement is not required. Any doubts and concerns the management may have about the future of the business, shall be disclosed in the financial statement.

Should doubts and concerns be expressed, the users of financial statements will be interested in all related occurrences and circumstances as well as the remedies intended by the management at their eradication or minimisation.

TABLE 1
REGULATORY APPROACHES TO THE ONGOING CONCERN

THE ONGOING CONCERN ASSUMPTION			
The Accounting Act	IAS	IFRS no 1	ISA 570
<p>Article 5 Section 2: Adopted accounting principles (policies) are applied on the assumption that an entity will continue as a going concern in the foreseeable future, without curtailing of the scope of operations. Article 49: the management of limited liability and joint stock companies shall prepare an annual report together with annual financial statements. The report should include material information on performance assessment and an identification of risks and a description of threats. If the ongoing concern assumption referred to in Article 5 Section 2 is not valid, the assets shall be measured at the lower of the realisable net selling prices and the cost of acquisition of manufacture, less accumulated depreciation or amortization and permanent impairment loss.</p>	<p>While evaluating whether the ongoing concern principle is justifiable for a business entity, one should take into account all available information that concern the future (at least one year ahead from the balance sheet day). Paragraphs 23-24 of IAS no 1 highlight sample issues which must be considered in the evaluation. IAS 1 obliges managements to conduct evaluation with respect to the ability of a business entity to continue operations.</p>	<p>Examination of a financial statement should provide grounds to issue an opinion that the statement is a clear and reliable reflection of the material and financial situation of the entity and its financial result. The auditor should clearly state that the company is an ongoing concern and can carry on in an unchanged scope for at least 12 months following the balance sheet date and that in this period there are no major threats foreseen for the entity. The auditor is obliged to determine the entity's ability or inability to continue operations.</p>	<p>ISA 570 deals with the auditor's responsibilities in the audit of financial statements relating to management's use of the going concern assumption in the preparation and presentation of the financial statements. The auditor is also responsible for identification of any uncertainties with respect to the entity's abilities to continue operations. ISA 570 points to financial and operational symptoms as well as other immaterial factors which may impact the entity's ability to continue operations.</p>

Source: Own work based on: ISA 570 § 10 (Szczepankiewicz, 2013).

Openness with such information builds trust of the users of financial statements as it shows that the management is able to assume risks in the strategic perspective and has foreseen a set of measures safeguarding against their consequences (Frendzel, Ignatowski, Kabalski, 2011).

In accordance with the law, the obligation to conduct assessment of the ability to continue as an ongoing concern lies on the management of the entity (Ryzak, 2016; Wójcik-Jurkiewicz, 2016). Information on ongoing concern must be included in the introduction to the statement, whereas micro entities are obliged to present it in the General Information section. In case of uncertainties with respect to the ongoing concern, these uncertainties must be described together with possible corrections and placed in the Additional Information and Explanation section. ISA 1 indicates that when financial statements are not prepared on a going concern basis, that fact shall be disclosed, together with the basis on which the financial statement is prepared and the reason why the entity is not regarded as a going concern. (ISA 1 § 23).

The decision not to regard a company as an ongoing concern may be impacted by information made available after the balance sheet date caused by occurrences that took place between the balance sheet date and the date when the financial statement was approved. If the head of the entity obtains information about the threat to ongoing concern after the financial report is completed, the following steps must be taken:

- the entries in accounting books for the relevant year must be corrected,
- the auditor must be notified about the situation.

Corrections in the completed financial report and accounting books may be made only in case of occurrences which took place after preparation of the financial statement and before its approval. If the events which occurred after the balance sheet date do not change the conditions existing at the balance sheet date, then appropriate explanations shall be included in the notes to the financial statement (the Accounting Act, Article 54 point 1).

III. THREATS TO THE ONGOING CONCERN

An integral part of each financial statement is the analysis of the entity's ongoing concern. Pursuant to ISA § 23 and 24 IAS 1, it is justified for a business entity which has been profitable and has had access to sources of financing to assume the ongoing concern. In this case the management of the entity is not obliged to conduct a detailed analysis of threats. In other cases assumption of the ongoing concern principle must be substantiated. The Accounting Act stipulates that in case of doubts regarding an entity's ongoing concern it is necessary to conduct the evaluation of this entity's assets at net realisable value, not exceeding their purchase price or production costs less depreciation and impairment loss. These detailed regulations mean that failure to assume the entity as ongoing concern triggers consequences not only for the entity concerned but also for its environment (Ryzak, 2016).

In the assessment of occurrences which may pose a threat to ongoing concern one should rely on the National Auditing Standard no 1 and on International Standard on Auditing no 570. According to the national standards, the signals of a deteriorating condition of an entity may be the following:

- financial issues e.g. liquidity problems;
- adverse key financial ratios;
- loss of major suppliers or sales markets;
- ongoing court and administrative proceedings against the entity, whose outcome may translate into huge liabilities which may be difficult for the entity to settle (Kumor, 2016).

The subject matter of threats impacting the assessment of the ongoing concern is widely presented in ISA 570, although the standard lacks appropriate definitions and ways of interpretation. The factors influencing a business entity may be classified according to various criteria e.g. internal factors i.e. related to the entity itself; and external factors related to the business environment. International regulations distinguish three main categories of threats:

- financial,
- operating,
- non-financial.

The regulations mention only some example situations and it is not always the case that occurrence of these situations will trigger a considerable uncertainty. Sample factors raising doubts with respect to an entity being ongoing concern are presented in Table 2.

TABLE 2
FACTORS THREATENING THE ONGOING CONCERN

Classification	Example events and conditions
Financial factors	<ul style="list-style-type: none"> • Net liability or net current liability position; • Fixed-term borrowings approaching maturity without realistic prospects of renewal or repayment; or excessive reliance on short-term borrowings to finance long-term assets. • Indications of withdrawal of financial support by debtors and other creditors. • Negative operating cash flows indicated by historical or prospective financial statements. • Adverse key financial ratios. • Substantial operating losses or significant deterioration in the value of assets used to generate cash flows. • Arrears or discontinuance of dividends. • Inability to pay creditors on due dates. • Inability to comply with the terms of loan agreements. • Change from credit to cash-on-delivery transactions with suppliers. • Inability to obtain financing for essential new product development or innovation.
Operating	<ul style="list-style-type: none"> • Loss of key management without replacement. • Loss of a major market, franchise, license, or principal supplier. • Labor difficulties or shortages of important supplies. • Appearance on the market of a new strong competitor.
Non-financial factors	<ul style="list-style-type: none"> • Non-compliance with capital or other statutory requirements. • Pending legal or regulatory proceedings against the entity that may result in claims that are unlikely to be satisfied. • Changes in law or regulation or government policy expected to adversely affect the ongoing concern. • Lack of sufficient insurance against a disaster.

Source: Own work based on: IAS 570 § 10 (Głębocka, 2016).

The auditor has a very important role in the evaluation of bias of the management and in the identification of distortions in determination of estimates. The bigger ignorance and bias of the management the more important is the role of the auditor (Raczkowska, 2016). Pursuant to ISA 200, the auditor issues the opinion on whether financial statements are prepared, in all material respects, in accordance with the applicable financial

reporting framework. The auditor also conducts examination of the entity's ability to continue operations. The same matter is also regulated in the national accounting standards. Both national and international regulations indirectly shift the responsibility for the ongoing concern assumption from the management to the auditor (Gostomczyk, 2013; Rydzak, 2016). The decision taking process regarding the decision on the ongoing concern is presented in Diagram 1.

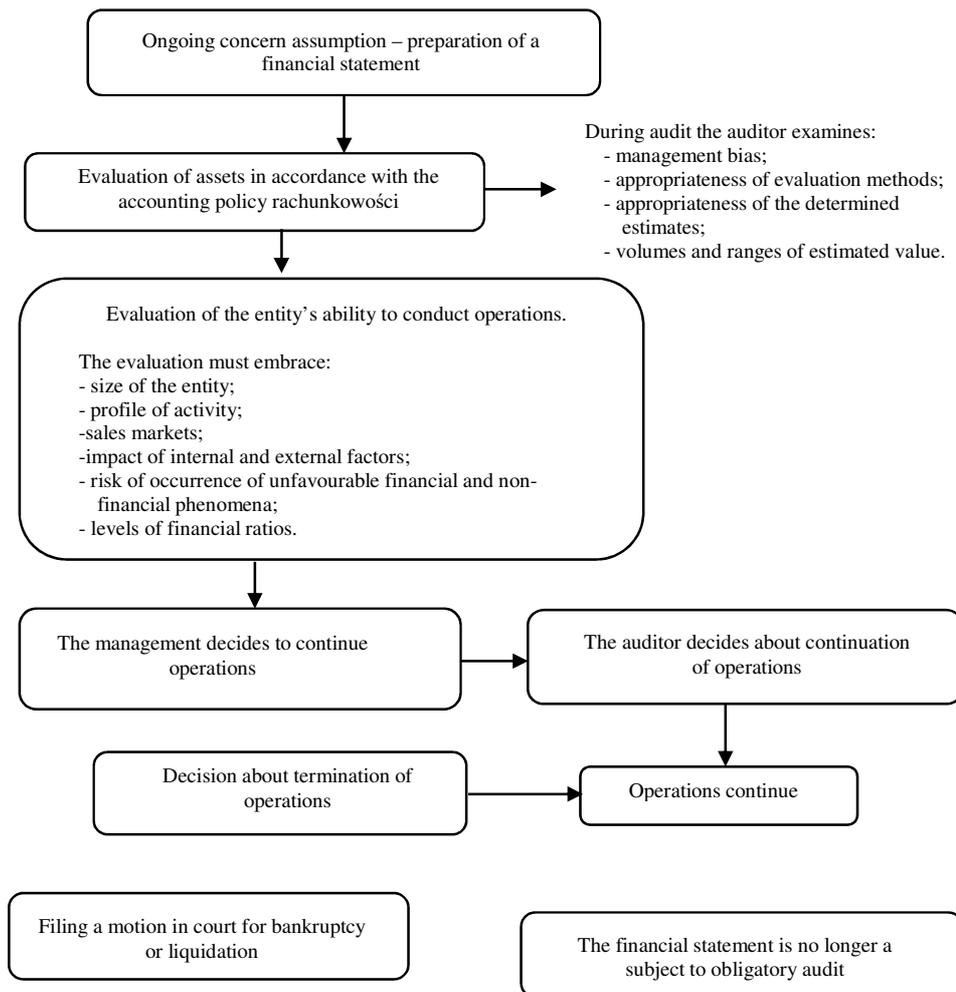


DIAGRAM 1. PROCESS OF TAKING DECISION ON THE ONGOING CONCERN

Source: Own work based on ISA 540 and the Accounting Act.

If after conducting a series of separate analyses the auditor is unable to issue a conclusive decision on the entity's ability to continue in business, the management has no choice but to terminate operations. At the same time the management is required to submit a motion for bankruptcy or liquidation and the auditor ceases to perform his duties related to the examination of the financial statement.

IV. APPLICATION OF DISCRIMINATIVE ANALYSIS IN THE ASSESSMENT OF THE ONGOING CONCERN VALUE

While conducting evaluation aimed at recognizing symptoms of threats for the ongoing concern, a number of different methods may be applied. The most commonly used classification of methods is based on two basic criteria. The first criterion puts emphasis on the nature of factors determining the

solvency of an entity used in a given method. Thus one may speak of the following methods:

- quantitative,
- qualitative,
- mixed.

In case of quantitative methods the subject of analysis is only data that can be measured, in qualitative, unmeasurable data such as opinions of sellers, executives, experts, surveys of consumers' intentions is analysed (Dittmann, 2008). The mixed method uses data from both approaches. The second classification criterion is connected with the methods of deduction concerning the level of risk of loss of solvency. The methods are based on:

- logical and deductive reasoning,
- empirical induction (unidimensional and multidimensional).

The logical and deductive methods are based on an

assumption that the evaluation of solvency of an entity is conducted on the basis of analysis of certain elements reflecting current economic and financial condition of the entity. The empirical induction methods involve mathematical and statistical analysis and offer a more objective way to compare businesses than the methods that rely on logical and deductive reasoning. The evaluation of results obtained by means of analysis using econometric model is then subject to subjective evaluation in order to explain the deviations of trend function values from postulated borderline values. The models based on discriminative analysis are included in the group of empirical deduction models (the evaluation is conducted on selected ratios whose choice is made following empirical research).

The classification of bankruptcy forecasting models to be found in literature on the topic is presented in Table 3 which assumes three groups of models: statistical models, methods of soft computing (using artificial intelligence for numerical calculations), and theoretical models.

TABLE 3
METHODS AND MODELS OF BANKRUPTCY FORECASTING

STATISTICAL METHODS	METHODS OF SOFT COMPUTING	THEORETICAL METHODS
Discriminative analysis models	Artificial neuron network	Entropy theory models
Logit models	Fuzzy logic	Hazard models
Probit models	Support vector models	Credit risk models (CreditMetrics, KMV, CreditPortfolio)
Decision trees	Genetic algorithms	

Source: Own work based on (Korol, 2010).

In order to evaluate an entity as an ongoing concern one may use a number of mathematical and statistical models. The research shows that models which give a warning against bankruptcy use financial factors calculated on the basis of accountancy data (Hołda and Micherda, 2007; Wędzki, 2012; Emerling, 2014; Śnieżek and Wiatr, 2011; Bauer, 2018). The advantage of discriminative functions is combining traditional ratio analysis with econometry. Additionally, easy interpretation of the achieved results as well as not complicated structure and objectivism, make the discriminative analysis the most frequently chosen method for detecting the threat of bankruptcy in the world (Hołda, 2006). It should be emphasized, however, that these are statistical models in which the function is calculated in a specific time framework and on a specific group of entrepreneurs. Therefore, the biggest efficiency of statistical models can be observed with respect to the industries on the basis of which the function parameters were calculated.

Of course, each model discussed in the paper has its flows. The most serious issues related to the discriminative analysis are:

- omission of qualitative factors and instability of legal regulations as well as erroneous decisions of fiscal audit organs (e.g. the Centrozap S.A. case),
- the models do not work in standard and

extraordinary situations,

- the occurrence of areas of uncertainty (the so called grey zone) in some models, in which it is impossible to unambiguously classify an entity into one specific group,
- the obsolescence of models and need of constant updating (Mączyńska, 2008).

In the process of selecting appropriate functions for the empirical part of the paper, the authors took into account the limitations described above and tried to eliminate them whenever necessary.

v. PBG S.A. CASE STUDY

The models of discriminative analysis are used in the paper as a tool for evaluation of an entity's ability to continue operations in the long term perspective. PBG S.A. which was chosen by the authors as the subject for the analysis is a public company listed on WIG20 of the Warsaw Stock Exchange. The company was established in 1994 and had its debut on the Warsaw Stock Exchange in 2004. PBG S.A. provides comprehensive, specialist contracting services for natural gas, crude oil, and fuel facilities. It acts as a general contractor, consortium member, or sub-contractor with respect to engineering design work, construction, repairs, operation, and

maintenance in the field of production of natural gas and crude oil, transmission of natural gas and crude oil, storage of natural gas and fuels (LNG, LPG, C5+, and CNG). PBG S.A. is a parent company of PBG Group consisting of entities operating in the specialist construction sector. The parent company employs 50 people while the Capital Group has a workforce of 2,600.

In the empirical stage of writing the paper the authors examined financial statements of PBG S.A. for the reporting periods 2010-2017. During the examination the authors applied three bankruptcy forecasting models which were proposed by D. Hadasik, J. Gajdka and D. Stos, and M. Hamrol. The models are presented and described in Table 4.

TABLE 4
THE PROCEDURE OF DETERMINING VALUES IN SELECTED MODELS WARNING AGAINST THREATS FOR ONGOING CONCERN

Model by	Description
D. Hadasik	$D(W) = 0,365425W_1 - 0,765526W_2 - 2,40435W_3 + 1,59079W_7 + 0,00230258W_9 + 0,0127826W_{12} + 2,36261$
	W_1 – current assets / current liabilities W_2 – (current assets – inventory) / current liabilities W_5 – liabilities / assets W_7 – working capital / liabilities W_9 – receivables * 365 days / sales revenue W_{12} – inventory * 365 days / sales revenue
	Critical point: 0,0
J. Gajdka and D. Stos	$Z = 0,7732059 - 0,0856425X_1 + 0,0007747X_2 + 0,9220985X_3 + 0,6535995X_4 - 0,594687X_5$
	X_1 – sales revenue / average annual total assets X_2 – average annual see: short-term * 360 / cost of manufacture of product sold X_3 – net profit / average annual total assets X_4 – gross profit / net sales revenue X_5 – total liabilities / net assets
	Critical point: 0,45
M. Hamrol	$Z = 3,562X_1 + 1,588X_2 + 4,288X_3 + 6,719X_4 - 2,368$
	X_1 – net financial result / total assets X_2 – (current assets - inventory) / short-term liabilities X_3 – fixed capital / total assets X_4 – financial results from sales / sales revenue
	Critical point: 0,0

Source: Own work based on: (Hołda, 2006); (Rutkowska, 2006); (Hołda, Micherda, 2007); (Spychała, 2013); (Iwanowicz, 2017).

The models presented in Table 3 have the form of a discriminative function. The critical point for the model of J. Gajdka and D. Stos, determined at the level of 0,45, means that if an entity achieves results higher than 0,45, its condition is good and there is no threat of bankruptcy, but when the result falls below 0,45 then there is a considerable risk of bankruptcy. In the D. Hadasik and M. Hamrol models the critical point is set at 0,00. How the models mentioned above are shaped for PBG S.A. is presented in Table 5.

Referring the financial results achieved by PBG S.A. (Table 4) to the critical value of the J. Gajdka-D. Stos model, one may infer that the results achieved in 2010 – 2011 show clear signals of a nearing bankruptcy as the figures were well below the critical point of 0,45. As of 2012, the management of the company started to implement various solutions aimed at improving liquidity, what in subsequent years had a positive influence on the company's chances to function as an ongoing concern. Since 2016 the ratios again were pointing to considerable difficulties at PBG S.A. As the result, on 26 February 2018 the auditor put in writing all concerns and doubts related to the future of PBG S.A. and addressed them to the Polish Audit Supervision Authority and to KNF- the Financial Supervision Authority.

TABLE 5
DISTRIBUTION OF DISCRIMINATIVE FUNCTION OF SELECTED MODELS IN THE EXAMINED PERIOD

Model	2010	2011	2012	2013	2014	2015	2016	2017
Gajdka - Stos	0,07	-0,10	1,99	4,85	3,67	3,15	-	-
Hadasik	1,79	1,75	0,20	1,16	-	-	0,38	0,58
Hamrol	3,00	1,38	10,45	2,62	2,68	2,98	2,39	0,67

Source: Own work based on data from PBG S.A financial statements (Raporty, 2010-2017).

The problems of PBG S.A. are also reflected in the figures obtained by means of the D. Hadasik model. The results for the period 2010-2017 oscillated around the assumed 0,00 critical point. Therefore, the future ability of the entity to continue operations had to be put in doubt. The discriminative function in the M. Hamrol model did not cross the critical point in 2011 but the function decreased as compared with the previous year what could be the signal of approaching problems with ongoing concern. From 2012 to 2015 there was a considerable danger of loss of the ability to continue operations. Positive outlook for the ongoing concern for the company can be observed in figures for 2016 as the ratio for this year was as at the level of 2,39. However, in the following year the ratio fell dramatically again. Indeed, in June 2012 following difficulties with obtaining funds for operations of PBG and two members of its group Hydrobudowa and Aprivia, the management adopted a resolution to file for reorganisation bankruptcy. When the information was announced, the Investment Fund Company was forced to reduce the price of PBG securities. The problems with the bankruptcy agreement lasted a long time and finally, in October 2015, the court issued a decision that confirmed the agreement, the decision became legally valid in June 2016. The legalisation of the court decision and implementation of the bankruptcy agreement stood a chance for the company to be fully operational again. However, figures for 2017 shows that the ongoing concern was still under threat. Nowadays it is critical for the company to monitor its sources of financing in order to meet the provisions of the bankruptcy agreement.

The legislation in force stipulates that application of generally accepted accounting principles requires the company

to be ongoing concern and the assumption must arise from the factual or legal state. Preparing an accurate forecast of an entity's financial condition on the basis of which the assumption of the ongoing concern may be made, is quite a challenge. All information about problems which may disturb functioning of the company as a going concern are vital for the evaluation of assets, they also impact all stakeholders of the entity. The J. Gajdka– D. Stos model and the M. Hamrol model provided an accurate picture of the condition of the company and reflected the issues that the company faced in 2012. The discriminative analysis used to examine PBG S.A. is regarded by experts as one of the most reliable tools for evaluation of threats to the ongoing concern, especially in the context of bankruptcy of business entities.

VI. CONCLUSIONS

The significance of contemporary accountancy in the conditions of market economy cannot be overestimated. The accountancy is a link by means of which a business entity can be evaluated and settled with its social environment. The correctness of this settlement is assured by the supervision of independent auditors who in the process of examining financial statements use financial reporting procedures and verify the performance of business entities. The discriminative analysis used by the authors of the paper is a very useful tool in the evaluation of validity of the ongoing concern principle and in increasing the validity of the economic turnover. Thanks to the analysis it is possible to detect entities threatened with bankruptcy in good time to allow their managements to implement remedial actions.

The financial analysis conducted by a certified auditor makes it possible to evaluate a financial statement and to point to possible threats for the entity's operations. Traditional ratio analyses (Micherda and Stępień, 2016) do not deliver uniform results and conclusions even when the ongoing concern is threatened. It is when the discriminative analysis procedures become useful in the process of examination of a financial statement and evaluation of the ability to continue operations.

The considerations put forward in the present paper led to the validation of the research hypothesis assumed by the authors. For cognitive and practical reasons the authors also highlighted the usability of selected discriminative models to the evaluation of a company as an ongoing concern in the long term perspective. The authors are fully aware of the limitations in extrapolating the results presented in the paper to all business entities belonging to the same sector as PBG S.A. The study is only preliminary and the sampling for the research was rather small. The conducted analysis in which selected models of discriminative analysis were applied in examination of PBG S.A. financial statements, presented a clear forecast of the 'company's future' and, at the same time, indicated yet another research gap regarding detailed analysis of business entities belonging to different sectors and called for testing the usability of the proposed solutions in other industries.

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