DIAGNOSIS OF BUSINESS AND PREDICTIVE MODELS OF BANCRUPTCY RISK – A MODEL DESIGN

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Abstract
In this paper we propose the development of a deterministic model for diagnosis the business performances, based on the current needs imposed by the requirements of a sustainable development economy. The beginning of the XXIst century brings new approaches to organization performance, so performance begins to be defined according to the value it creates for all stakeholders. The proposed model is based on assessing a FESG score type (based on four pillars of sustainable development (Economic/Financial, Environmental, Social and Governance).
So, we extend the Triple Bottom Line approach introduced by Elkington (2002) with Quadruple Bottom Line, by adding in our score besides the economic/financial, environmental and social dimensions, a fourth dimension which is corporate governance. Maximizing economic, social and environment performances can be done only in the context of good collaboration at the level of corporate governance structures through which conflicts of interest are diminished. In our model we used *SWOT method (Strength, Weakness, Opportunities and Threats)* combined with the *evaluation grids method* (based on Likert scale with five levels). Also we have in mind the credit rating methodology used by Standards & Poors or Fitch agecies.

1. Introduction

In the current global economic context, the study of diagnosis the business performances and corporate bankruptcy risk becomes a very complex problem because of many economical, financial, social, geographical, political factors that it depends.

Determining the 'state of health' of companies is an important activity because diagnosing can establish the measures that managers must take so that companies

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will withstand the competitive environment. In the current conditions, when the global financial crisis is more acute, it's important for companies to set objectives in order to overcome the crisis in that country (Hada and Halga, 2011)**.**

Moreover, in the current conditions of sustainable development when the company's activity must focus not only on creating profit but also on how to create this profit by promoting ethical values, also the approaches to assessing business performances are changing and therefore   the ways of substantiate the diagnosis of a business.

A diagnosis of the business is extremely useful for all business partners when in theirs decision-makings, as follows:

a) *for Management* (in various decision-making policies such as investment and finance policies, operating activities policies, collecting receivable policies, acquisitions/merges activities, human resource management etc);

b) *for Investors or Shareholders* (in their decision on capital investment to know what is the value of capital return and to control the results and the potential to distribute dividends

c) *for Employees* (to know about sstability of employment, the existence of a reasonable level of remuneration linked to profitability entities, the existence of an insurance system and an adequate social protection, to know about professional opportunities etc);

d) *for Banks (*in assessing the creditworthiness analysis);

e) *for Suppliers* (who are interested in knowing the ccreditworthiness of the client's company (buyer), it means its liquidity and solvency, depending on who they can design the clients policy;

f) *for Clients* (who are interested in knowing the economic and financial performances of the supplying company for determining the ability to ensure the customer supply requirements with the volume, quality and structure of goods and services; also client need to know about the business continuity of supplier);

g) *for Governments and its institutions* (*National Ministries of Finance* need: to develop strategies and fiscal policies; to run the fiscal control; to establish the penalties for unpaid tax debts; to allocate or stop of financial resources in governement investment policy; to asses the   economic and financial indicators at the macroeconomic level; *National Ministries of Justice* require judicial diagnostic analyzes based on financial information in respect of disputes between participants in economic life or in case of bankruptcy; *National Ministries of Coordinating the European* funds absorption is in direct relation with Bruxelles, for accelerating the absorption of European funds. *National Chambers of Commerce and Industry, Nationals Statistics Institute* are interested in making a competitive hierarchy in order to establish market leadership or in order to knowing the position of a company by referring to competitors.

h) *For Community and Non-governments institutions* (*Financial analysts, companies of consulting, rating companies or rating agencies* need to

express theirs opinion about a business state of a company in order to predict the future of business and evaluating the risk of failure; *Local policymakers* are interested in the evaluate the business performances to calculate their contribution to the local economy, to know about employment and training workforce, trends in prosperity company, domains of activity and so on; *Environment agency* are interested in anti-pollution policies promoted by entities, compliance with environmental regulations allowed; *Offices of protect the consumer* need to explain the increasing in prices, the rapport between quality and price of a goods and services sold and so on).

A diagnosis of the business will have to provide the information on the financial position, performances, cash flows and the risks it is exposed able to predict the future activities and also to identify the failure risk. In the context of analysis needs as adapted as possible to the current economic of XXIth century, in our paper we propose to develop a diagnostics of global business able to evaluate the business performance and the risks to which it is exposed including also the risk of insolvency and bankruptcy.

2. Literature review
2.1. Methods
In literature there are a significant number of studies on the topic of the diagnostic business and prediction of bankruptcy risk. An important criterion underlying the classification of these studies relates to the working methodology, therefore we can identify deterministic or statistical models of diagnosis the bankruptcy risk.

A. Deterministic models of diagnosis and prediction the bankruptcy risk

These models use comparison, induction-deduction, analysis-synthesis, scoring, evaluation charts etc. When selecting the indicators representing a diagnosed field and when ascribing importance scores, a very important role is held by the experience and the professionalism of the financial analyst. These will help him make objective and adequate qualitative and quantitative evaluations. In this respect using SWOT method (to ensure a quality approach) in combination with *the evaluation grid method* (to ensure a quantitative approach).

Many banks, rating agencies or governement institutions are using the deterministic models in order to encapsulate the final rating of business on which further they (or other users) will be based on decision making process.

a) The Ernst & Young model
Ernst & Young is one of the biggest consultancy and audit companies in the world and is part of the four largest auditing firms in the world called the Big Four, along with KPMG, PricewaterhouseCoopers (PwC) and Deloitte Touche Tohmatsu. Ernst & Young use a deterministic algorithm in order to asses a score for making a top of Major companies in Romania[7].The ranking methodology includes a scoring system

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[7] Ranking methodology for Major Companies in Romania Developed by Ernst & Young Romania and Doing Business, 2012, available on the website www.doingbusiness.ro

by which each company is assessed, based on turnover, quantitative and qualitative aspects, all considered in particular weights which reflect our insights regarding the specifics of doing business in the local market (see Figure 1).
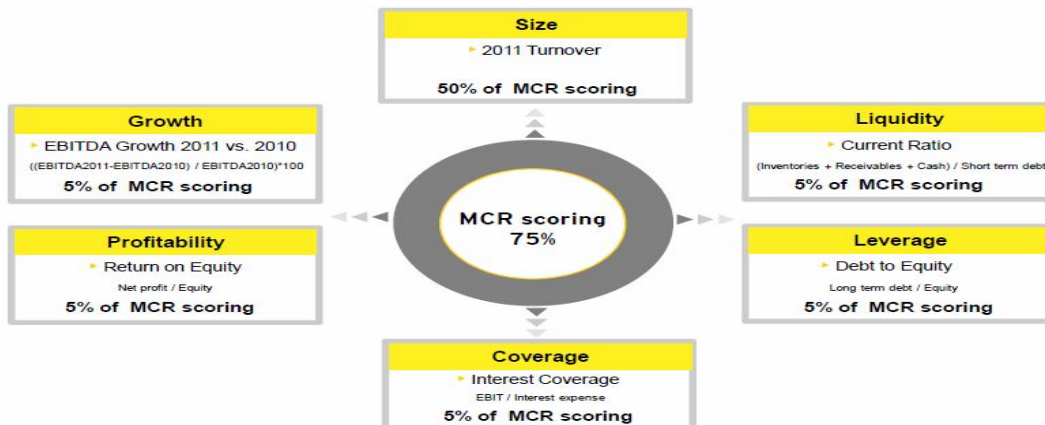
Figure 1: Ernst & Young scoring methodology
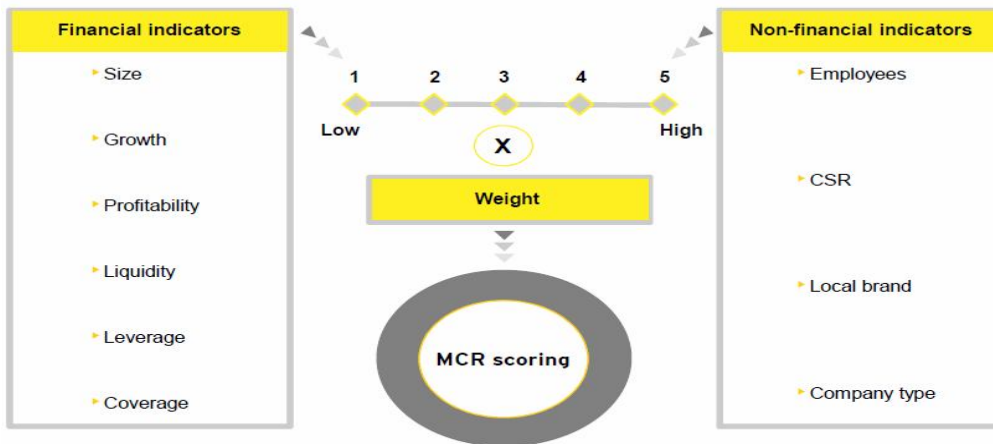
Source: Ranking methodology for Major Companies in Romania, 2012

The quantitative indicators as the most relevant business performance indicators are used such as: Earnings before Interest, Taxation, Amortization and Depreciation (EBITDA), and its evolution over the past two years, Liquidity Ratio, Return on Equity, Debt to Equity Ratio, or Interest Cover Ratio. Other criteria analyzed included the average number of employees and the number of years since incorporation in Romania (see Figure 2).

Figure 2: Ernst & Young financial indicators

Source: Ranking methodology for Major Companies in Romania, 2012

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The qualitative analysis was applied to aspects such as: corporate social responsibility and environmental initiatives developed in Romania, contribution to developing a local brand, and online presence (see Figure 3).

Figure 3: Ernst & Young non- financial indicators
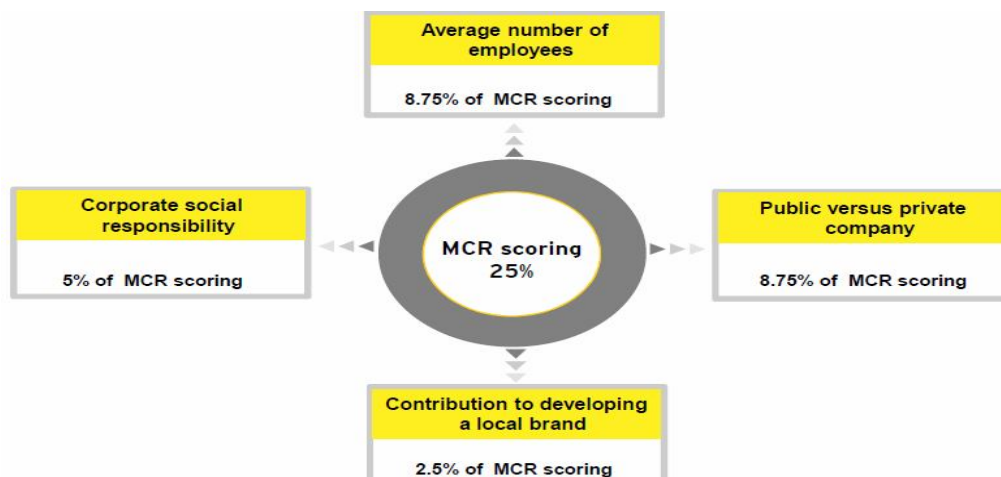
Source: Ranking methodology for Major Companies in Romania, 2012

Each indicator has been assessed based on a scoring grid from 1 to 5 allotted for specific value intervals, 1 being the value assigned for the lowest performance on that specific indicator, and 5 being assigned for the highest performance.

b) The model of creditworthiness used by Romanian banks
Models drawn up by numerous Romanian banks within the methodology for crediting decision are based on the deterministic techniques. The final scoring used both the financial and non-financial data classifying the credit risk in five categories:[8]

- *Category A (standard credit):* this rating reveals a high level of performance that will allow reimbursement of principal and interest; there are the signals of a harmonious relationship between the bank and client in the future;
- *Category B (credit under observation):* this situation is similar to the first category in terms of the quality of financial performance, but it is anticipated that in the future these relationships can not be maintained;
- *Category C (substandard credit):* this rating generate the satisfying level of financial performance, but there will deteriorate in the future;
- *Category D (doubtful credit):* involved a lower financial performance, with a cyclicity manifested at short intervals;

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[8] The credit framework of Romanian National Bank in force available on the website Romanian National Bank www.bnr.ro

- *Category E (credit loss):* there are company losses reflecting the fact that company will be unable to pay the principal and interest in the future.

Only the first third categories of credits are taking into consideration for lending de client. Categories D and E involved a high risk for banks and therefore in these case there is not any lending.

The models of credit scoring drawn up by the main Romanian banks *use a combination* of the financial and non-financial criterion, as follow:

a) *Romanian Commercial Bank (BCR):* eight financial criterion are calculated and are determinant for the global rating; non-financial criterion only complete the global decision)

b) *Transylvania Bank (BT):* five financial criterion are determined and two non-financial criterion;

c) *Romanian Development Bank* –Groupe Société Générale (BRD): use only five financial criteria, there are no used non-financial criterion)

d) *Raiffeisen Bank (RB):* use five financial criterion weighting 75 % in total rating and two non-financial criterion weighting the rest of 25 % in total rating.

c) The model of Romanian Chamber of Commerce and Industry [9]

Romanian Chamber of Commerce and Industry (CCIR) determines a financial score of business company in order to classified the companies by level of performance. The final results are then published as a National Top Companies for the current year. These catalogues will be distributed to the Romanian and foreign companies, organizations, national and international institutions that promote and support businesses (embassies, business centers, export councils, International Chambers of Commerce and Industry).

For these objectives, the companies are preliminary classified the companies by domains and size. Six domains of activity are used as follow: R & D and High-Tech; Industry; Agriculture and Fishing; Constructions; Services; Commerce Export, Tourism. Classification by size class of entities is done as follows:

- Micro: have up to 9 employees and an annual turnover or total assets net of up to 2 million euros.
- Small enterprises: have between 10 and 49 employees and an annual turnover or total assets net of up to 10 million euros.
- Medium-sized enterprises have between 50 and 249 employees and an annual net turnover of 50 million euros, equivalent, or total assets not exceeding of 43 million euros;
- Large enterprises: between 250 and 999 employees
- Very large enterprises: more than 1,000 employees.

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[9] The model is presented on the website of Romanian Chamber of Commerce and Industry: http://www.ccir.ro

Five performances criteria are selected as follow: I1 *Turnover;* I2 *Operating profit;* I3 *Rate of return* = (Current profit / Turnover); I4 *Work efficiency* = (Value added / Average number of employee); I5 *Return on investment* = (Earning before interest and taxes) / Total assets).For the group of *Export and intracomunitar transactions* of the *Commerce, Export, Tourism* domain, some corrections and adjustments in the above indicators are made such as:

• *Turnover* is replaced by revenues collected from *intra and extra community sales;*

• There are not takes into account: operating profit, development effort, and return on investment.

The final business rating of the company is determined based on the following information which could be already known or could be calculated:

• *National average* (M1, M2, M3, M4, M5) for each of indicators (I1, I2, I3, I4, I5) which are determined depending on the domains and size of activities.

• *The simple score collected from each selected indicators* (N1, N2, N3, N4, N5) which are determined as a result of a rapport between de value of indicator for the company and the national average of that indicator N = I / M;

• *The weight of importance* given to each indicators depending on the domain of activity (p1,p2,p3,p4,p5) as is presented in the following table:

Table 1. The weight of importance used in assessing the global score by CCIR

Criterion / Domains	Turnover I1	Operating profit I2	Profit margin I3	Work efficiency I4	Return on investment I5
Research / development / High-Tech	40%	10%	10%	20%	20%
Others domains	50%	20%	10%	10%	10%

Source: www.ccir.ro

Determining the financial rating of business as follows:

$$R = \sum_{i=1}^{5} p_i x N_i$$

where ,

- R represents the global rating (the global score) of a company;
- p_i is the weight of importance given to each indicators;
- N_i represents the degree of achievement of the indicator "i" relative to the national average (N=I/M) and it is determined for each firm k.

The model of business diagnosis elaborated by CCIR has the disadvantage to not evidence the evolution of business activity but only the state for a certain period of time (one financial year). But the evolution of business is very important in order to predict the future risks about continuous activity. Another disadvantage of this

model consist in not using a scale with minimum and maximum rating of 5 or 10 levels which could make more comparable the results .

The CCIR rating could be a number around 1 and can be no matter how large or small compared to this reference, showing the position of financial business of a company comparing to sector average for a year.

However, by comparing the results of CCIR for every year of activity it would be concluded the real performances of business.

d) Coface Company
Coface Company is also a big consultant in business company, total its total network cover 99 countries in the world. Among the others services, Coface Company provides comprehensive reports on companies that also contain a "credit rating" that evaluate the risk of insolvency of the company investigated using a scale from 0 (the charge being) to 10 (risk nonexistent).

The Coface rating takes into account both the company's financial indicators and non-financial factors (qualitative) such as business development, payment arrangements, changes in number of employees, etc.. It is considered also how the company has honored its payment obligations.

B. Statistical models of diagnosis and prediction the bankruptcy risk
These models are based on statistical techniques such as: Discriminant Analysis, Principal Component Analysis Logit/Probit Analysis and Hazard Model. The best known foreign statistic models of financial diagnosis are *Altman Model, Canon Holder Model, National Bank of France Model, Taffler Model, Robertson Model*).
In our country (Romania) there were drawn up financial diagnosis models adapted to the Romanian emergent type economy: *Robu & Mironiuc Model*, *Anghel Model, Cămăşoiu-Negoiescu Model, "C" Model* drawn up by analysts from Craiova University, *Armeanu et al. Model,, Băileşteanu Model* etc.
The statistical techniques have the advantage of a higher bankruptcy risk prediction because of they suppress in a most expressive way, the trends of economic and financial activity of the company, following observations made on a significant period of time ago. Based on the large study investigated by Bellovary et al. (2007), they conclude that the multiple discriminant analysis is the most common method of predicting the risk of bankruptcy, being used in 38% of the investigated studies.
The earlier work of Beaver (1966) indicated that the financial ratios can predict the likelihood of bankruptcy. His univariate study evidenced that the financial ratios of bankrupt firms generally differ from those of no bankrupt firms and pointed out that the cash flow-to-debt ratio. The work began by Beaver was continued by Altman (1968) who introduced multivariate discriminant technique for predicting firms' failure (MDA). Both (Beaver and Altman) are considered pioneers of bankruptcy risk model based on financial criteria aggregates by multiple discriminant analysis technique.

Since 1968, the primary methods that have been used for model development are multivariate discriminant analysis (MDA). In a general approach, scoring method is based on a block rate (indicators) statistically determinated, weighted by some coefficients in a mathematical model which could determine with some probability the future health of entity. Thus, the analyzed entity is assigned a note Z, called "ZETA score" which is a linear combination of several installments, as follows:

$$Z = a_1R_1 + a_2R_2 + a_3R_3 + \ldots + a_nR_n ,$$

whereas
- $R_1, R_2, R_3 \ldots R_n$ - represents the values of discriminant financial ratios;
- a_1, a_2, a_3 – represents selected importance of financial ratios..

Depending on the obtained score value the company shall be presumed healthy or bankrupt. Synthetically, multiple discriminant analysis is a statistical technique used to classify an observation in two or more groups, depending on observable individual characteristics.

Belovary et al. (2007), based on theirs vast literature they found among those 752 factors which are utilized in the individual studies, the main ten financial ratio, as follows: 1) Net income / Total assets; 2) Current ratio ; 3) Working capital/Total assets, 4) Retained earnings / Total assets; 5) Earnings before interest and taxes (EBIT) / Total assets; 6) Sales / Total assets; 7) Quick ratio; 8) Total debt / Total assets; 9) Current assets / Total assets; 10) Net income / Net worth.

We can also conclude that the most popular financial ratios selected for predicting bankruptcy risk are (Achim & Borlea, 2012):

- *Profitability ratio* represented by return on assets (Beaver, 1966; Deakin, 1972; Libby, 1975; Ohlson, 1980; Lennox, 1999; Abdullah, 2008; Zulkarnain, 2001; Lykke et. al 2004; Siminica, 2005).
- *Leverage ratio* represented by total liabilities to total assets (Beaver, 1966; Deakin, 1972; Ohlson, 1980; Zmijewski, 1984 ; Dugan and Zavgren, 1989; Mohamed 2001; Anghel, 2002; Lykke et. al . 2004; Abdullah; 2008).
- *Cash flow ratio,* represented by cash to total assets or cash to current liabilities (Lennox 1999; Zavgren et Dugan, 1989; Low et al. (2001) and Zulkarnain, (2001; Ivoniciu ,1998; Bailesteanu 1998, Anghel, 2002);
- *Size activity* (Ohlson, 1980; Lennox, 1999; Shumway, 2001; Lykke et. al 2004).

Many banks, rating agencies or governement institutions are using the statistical techniques for assessing the rating business of theirs clients, we can mention the following:

a) Danmarks National Bank
In Denmark, Lykke et. al (2004) by using the Logit regression, developed an accounting-based model developed in Danmarks National Bank to predict failure rates in the Danish corporate sector. The estimated accounting-based failure-rate model contains a number of nine variable (five quantitative and four qualitative-dummy variable). The selected quantitative criteria are: *Adjusted ROA, Debt ratio,*

Solvency, Liquidity and Size activity (measure by total assets). The selected qualitative criteria are: *Capital reduction; Company age; Form of ownership (private or public); Critical auditor comments.*
The result of this study (encapsulated in Denmark National Bank) reflects the major importance of non-financial indicator comparing with financial indicator, as follows:

▪ the company which has a *critical auditor* comments has the *3 times higher* probability of failure than a company without a critical remark of auditor;
▪ the company which *reduced its capital* under the previous (initial) level has *2.5 times higher* probability of failure than a company with non reduction of the capital;
▪ the company which has in majority a public property has *1.5 times higher* probability of failure than a company with private property;
▪ a new company (under five year of business) has *1.4 times higher* probability of failure than a company over five years in business;
▪ all the other 5 indicators financial variables registered levels of odd ratio under 1.3 times higher probability to failure relative to a non-failure);

The results highlight an inferior importance of financial indicators comparing with the non-financial variables in assessing the probability of failure.


b) Dun & Bradstreet model
Dun & Bradstreet is a big consulting company in the world which developed a score model for predicting company failure. D&B Failure Score model predicts the likelihood that an organization will obtain legal relief from its creditors or cease operations over the next 12 month period. The Failure scorecard also looks for events signaling the onset of failure, such as a meeting of creditors, administrator appointed, bankruptcy, receiver appointed, and petition for winding-up. D&B model is based on a sample of 2.6 milion UK business, from which 2,5 million are situation in a "Good" area of failure risk and 70 thousand business are in a "Bad" area of failure risk. The obtained scorecard has characteristics that differentiate "Good" (healthy trading business) from "Bad" (failed or distressed business)
 Over 70% of variables taken into account are non-financial variables and 30 % are financial ones. These variables used in the D&B Failure Score are:

▪   *Financial* – Ratios and trends taken from annual and interim accounts.
▪   *Demographics* – Including business age, location, line of business and corporate linkage.
▪   *Public detrimental information* -Such as CCJs, mortgages/ charges and the legal pre-failure events (administration, receivership, bankruptcy, etc).
▪   *Principals* – The principal's experience and performance of associated businesses.
▪   *Trade Experiences collected through the D&B Trade Programme***.** Businesses regularly provide their experiences of the payment habits of businesses they are trading with.

▪ *Economic Index* – The Economic Index reflects the risk to different industries when the economy changes.

Graphic 1: The areas of information used in the D&B Failure Score
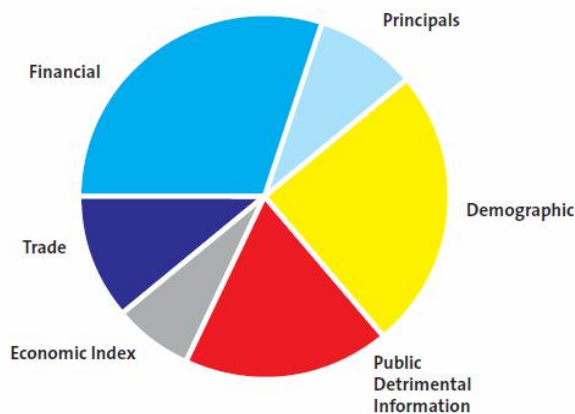
Source: D&B Rating Guide (2009)

It is built on a scale of 0 to 10 where 0 represents lower stability (0 = more risk) and 10, higher stability (10 = less risk). This score relates to the *probability of business closure in the next six months,* as follow:

Table 2: Probability of closure in D&B Model

Score	Probability of closure	Score	Probability of closure
10.0 --9.1	0.66%	5.0 --4.1	3.66%
9.0 --8.1	1.04%	4.0 --3.1	4.58%
8.0 --7.1	1.41%	3.0 --2.1	6.12%
7.0 --6.1	1.74%	2.0 --1.1	8.76%
6.0 --5.1	2.58%	1.0 --0.0	15.08%

Source: D&B Rating Guide (2009)

Many large **rating agencies** such as **Standard & Poor's (S&P)** , **Moody's and Fitch** use the statistic techniques to asses the credit rating as a financial indicator to potential investors of debt securities such as bonds. Typically, ratings are expressed as letter grades that range, for example, from 'AAA' to 'D' to communicate the agency's opinion of relative level of credit risk.

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The Standard & Poor's credit rating opinions are categorized in 12 categories of risk as follow: [10]

- 'AAA': Extremely strong capacity to meet financial commitments. Highest Rating.
- 'AA': Very strong capacity to meet financial commitments.
- 'A': Strong capacity to meet financial commitments, but somewhat susceptible to adverse economic conditions and changes in circumstances.
- 'BBB': Adequate capacity to meet financial commitments, but more subject to adverse economic conditions.
- 'BBB-': Considered lowest investment grade by market participants.
- 'BB+': Considered highest speculative grade by market participants.
- 'BB': Less vulnerable in the near-term but faces major ongoing uncertainties to adverse business, financial and economic conditions.
- 'B': More vulnerable to adverse business, financial and economic conditions but currently has the capacity to meet financial commitments.
- 'CCC': Currently vulnerable and dependent on favorable business, financial and economic conditions to meet financial commitments.
- 'CC': Currently highly vulnerable.
- 'C': Currently highly vulnerable obligations and other defined circumstances.
- 'D': Payment default on financial commitments.

All the above models (both deterministic and statistical) mainly use financial criteria (such as financial ratios as follow: liquidity, solvability, profitability, cash ratio etc.). Various specialists appreciate that these models are not completed and they should be filled and complete the global risk model of failure with non-financial approaches (with reference to age, market share form of ownership, sector of activity, management team, auditor critical comments, country risk, clients satisfaction etc.).

2.2 Variables
How about the types of variables are used in the methodology of assessing a diagnostic of business's model? The *classical approach* of performance concept statued by Friedman (1970) according to which only the profit counts is replaced by the *modern approach* of performance concept introduced by Freeman in which the means of obtaining this profit become more and more important. From profit and then return-based performance, the beginning of the XXI century brings new approaches to organization performance, so performance begins to be defined according to the value it creates for all stakeholders. In the current conditions of globalizing the world economy, the performing enterprise is "the enterprise which creates added value for its shareholders, satisfies the clients' requests, takes into

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[10]   Standard   &   Poor's   Credit   Ratings   Definitions   &   FAQs, http://www.standardandpoors.com

account the employees' opinion and protects the environment. Thus, the shareholding is content because the enterprise obtained the desired profitability, the customers trust the company's future and the quality of its products and services, the employees are proud of the company they work for and the community benefits, through its policy, of the protection of the environment."(Jianu, 2006, pp.18).

A company's global performances should be tracked and evaluated in terms of ensuring the sustainability of the business. Thus, in addition to purely financial performance, it will be taken into consideration the non-financial valences, that non-financial variables add to the company's performance. On the level of the company's activity there are a number of qualitative (non-financial) variables that have a significant impact on business organization but cannot be reflected in the financial statements:

   a) Manifestation of corporate social responsibility by conducting social and environmental activities, which are designed to ensure the company's sustainability on the market.

   b) The characteristics and the structure of corporate governance;

 To the above variables we can add:

   c) *The company's human capital* a) the personnel's training and qualification; b) the oscillation of employees' number; forms of employees' motivation;

   d) The company's image on the market: a) characteristics and development rate (growing tendencies) of the company's activity sector; b) position on the market: leader on the activity sector or not; c) company's brand; d) clients' fidelity;

   e) Orientation towards activities of research-development-innovation;

   f) Informational capital reflected through the rate of informational technological development**;**

   g) *Quality of compiling and reporting financial statements* as the suspicion reflected by a *financial auditor* on some sorts of financial transactions;

   h) Macroeconomic environment: a) the extent of development of the country where the company is active; b) governmental policies.

The Triple Bottom Line (TBL) approach introduced by Elkington (2002) focused the business company not only on the purpose of creating the economic value for shareholder but especially towards on creating the social and environmental values. The TBL concept means „economic prosperity, respecting the environment, respecting and ameliorating social cohesion". (Pesqueux, 2002). For Reynaud (2003) and Baret (2006) the global performance represents the aggregation of *economic, social and environment performance.*

In parallel, the *fourth dimension* of global performance was developed namely the one linked to *corporate governance.* Maximizing economic, social and environment performances can be done only in the context of good collaboration at the level of corporate governance structures through which conflicts of interest are diminished. Efficient corporate governance allows shareholders to make sure that the enterprises where they own social parts are led according to their interests. In this respect we check at least the following corporate governance aspects: the

competence and the composition of the Board; the independence of directors, the remuneration of the board members; the way of respecting the shareholders' rights and the principle „a share equals a vote equals a dividend"; the way of respecting the minor shareholders' rights; information transparency guaranteeing the reality of the published information; the quality of internal control.

In what the assessment of the global performance of the company is concerned, we have to mention the international rating agencies' concerns to substantiate the companies' non-financial scores of the ESG (Environmental, Social and Governance) type, which are used in conjunction with the financial score in order to increase the evaluation accuracy of a company's performance and assessing the risk (Achim & Borlea, 2013:90).

Also we can conclude that the Triple Bottom Line Approach became The Quadruple Bottom Line, by maximizing the economic results only if it can satisfy the interests of all partners: shareholders, employees, suppliers, customers, creditors.

Quadruple Bottom Line approach in describing the business performance can be design as in the figure below:

Figure 4: Representing the global business performances of the company
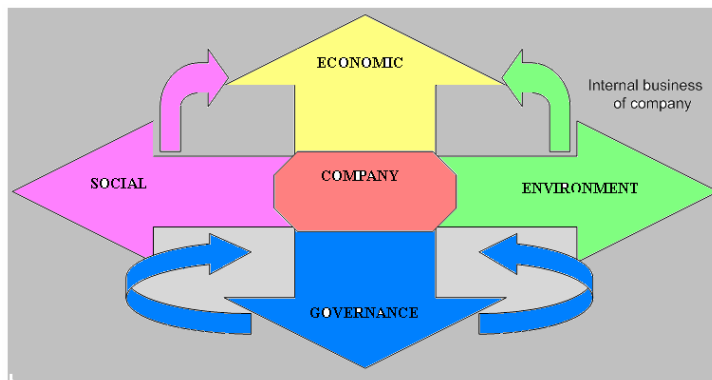
Source: own projection

3. Designing a model of business diagnosis - FESG model of business diagnosis
Basing on the investigated literature, we propose to assess a deterministic model for business diagnosis under a FESG score type (based on four pillars of sustainable development (Economic/Financial, Environmental, Social and Governance). In our model we used *SWOT method (Strength, Weakness, Opportunities and Threats)* combined with the *evaluation grids method* (based on Likert scale with five levels). Also we have in mind the credit rating methodology used by Standards & Poors or Fitch agecies.

In assessing the model of a global diagnosis, a major impact has the activity sector in which the company operates. Therefore, it is very important the companies to be classified by sector and only after that within the sectors on size classes (micro

enterprises, SMEs and large enterprises). Given the characteristics of Romanian companies and the degree to which they have adopted the characteristics of the "new economy", we will develop a diagnostic model of their work using predefined reference levels.

In order to design the business model of diagnosis we use *the evaluation grid method* by establishing a rating scale of five levels of evaluation, noted with grades from 1 to 5, as shown in the table below:

Table 3: Chart for evaluate the status of FESG indicator

Grade (N)	1	2	3	4	5
State	Critical	Weak	Medium	Good	Forte

The "very good" values will correspond to the best values achieved by the analyzed company comparing with the average of sector for a certain indicator. The critical values will correspond to the lowest values of various analyzed indicators compared with the average of sector. The average can be highlighted by calculating the mean value or the median value (the latter is applied in practice by many banks because it is considered to be more representative than the mean value as it removes the errors from aggregation of negative values).

Thus, the calculation of mean / median value of different representative indicators for the company's performance becomes an extremely important process in determining the final rating of a company. These values must be distinctly highlighted within separate samples for the homogeneous societies in terms of activity sector and size.

The FESG score of diagnosis the business is obtained by the following steps:

a) For the **Economic/Financial performances,** the **financial rating** is determined according to the formula:

$$F = \sum_{i=1}^{n} p_i x N_i$$

where,

- p_i – the weight of importance given to each economic-financial indicators;

- N_i – represents the points collected by each of the economic-financial indicator "i", depending on the position of indicator in relation to the sector average (see Table 3).

Among the financial/economic indicators we select the following ratios: Current liquidity ratio (Current assets on Current liabilities); Debt ratio (Total Debts/ Equity); Profit margin ratio (Net profit on Sales); Net working capital on total assets; Return on equity; Return on assets; Cash-flow on total assets.

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b) For **non-financial performances** for which it can be identified the environmental, social and corporate governance performances, we will determine the **ESG score (Environmental, Social, Governance)**, as follows:

$$ESG = p1*E + p2xS + p3*G ,$$

where

- p1, p2, p3 represents the important ratios given to the variables: environmental, social and corporate governance performances; These could be statistically or deterministic determined. Based on investigated literature, we found that each of the three indicators is very important so we can tip the balance toward one or another of the three indicators. We will also give the equal important ratios to each of Environmental, Social and Governance indicators.
- E represents the score given to the company for environmental performances; In creating a model of environmental assessment scales performance, we will rely on sustainable GRI reporting system, which is the most widely used sustainability reporting framework. According with the latest generation of GRI Guidelines (GRI 4 Guidelines, 2013), the *environmental performances* indicators are in number of 34 and are grouped in twelve area, as follows M*aterials; Energy*; *Water*; *Biodiversity*; *Emissions, Effluents and waste*; *Products and services*; *Compliance; Transportation; Overall; Supplier environmental assessment; Environmental grievance mechanisms.*
- S represents the score given to the company for social performances; Based on GRI 4 Guidelines (2013) the *social performances* indicators are grouped in *Labor practices; Human rights*; *Society*; *Product responsibility*.
- G represents the score given to the corporate governance performances (see Achim & Borlea, 2013).

c) Finally, the **global rating** of the business performances is determined by aggregating the financial with the non-financial performances, as follows:

$$FESG = P1*F + P2*ESG,$$

where

- FESG represents the final score (the final rating) of the business performances that includes both financial and non-financial aspects (that are represented by environmental, social and corporate governance performances);
- P1,P2 represents the ratio given to the financial (F) and non-financial (ESG) performances. Based on investigated literature we will give fifty/fifty percent for each of two main area of performances (financial and non-financial one)

The final FESG score reflects different values on a scale from 1 to 5 that will classify the companies in one of the global rating classes, as we presented in the table below:

Table 4: Interpreting the final FESG score

Rating	Scoring	Analytical classification	General classification
AAA	FESG≈5	Forte state, the bankruptcy risk is extremely low.	In this case, the business functions very well, the economic and financial state represent a STRENGTH for the company. The development potential is very high. The position on the company's life cycle curve is: development-maturity. The bankruptcy risk is very low.
AA	4,5 ≤FESG < 5	Very good to forte state, the Bankruptcy risk is very low.	
A	4 < FESG < 4,5	Good to very good state, the bankruptcy risk is very low.	
BBB	FESG≈4	Good state, the bankruptcy risk is low.	In this case the business is viable, economic and financial conditions represent a STRENGTH, future development can take place. Position on the life cycle curve is development-maturity, the required strategies are either investment or neutral strategies. The bankruptcy risk is low.
BB	3,5 ≤ FESG < 4	Satisfactory to good state, the bankruptcy risk is low.	
B	3 < FESG < 3,5	Satisfactory state, the bankruptcy risk is medium.	
CCC	FESG≈3	Satisfactory state, the bankruptcy risk is medium.	In this case the business is facing some problems, economic and financial conditions are framed as a WEAKNESS. Growth possibilities are uncertain, recovery possibilities are reduced. The position on the life cycle curve is launching or decline, therefore either investment or disinvestment strategies are necessary. The bankruptcy risk is incert.
CC	2,5 ≤ FESG <3	Unsatisfactory to satisfactory state, the bankruptcy risk is high.	
C	2 < FESG <2,5	Unsatisfactory state, the bankruptcy risk is high.	
DDD	FESG≈2	Weak state, the bankruptcy risk is high.	In this case the business is facing major problems; the economic and financial conditions are classified as CRITICAL. The position on the life cycle curve is launching or decline, therefore either investment or disinvestment strategies are necessary. The bankruptcy risk is high.
DD	1,5 ≤ FESG <2	Very weak to weak state, the bankruptcy risk is very high.	
D	1 < FESG <1, 5	Critical to very weak state, the bankruptcy risk is very high.	
D-	FESG≈1	Critical state, the bankruptcy risk is imminent.	The company's condition is extremely CRITICAL, it faces financial illiquidity and there is a risk of imminent bankruptcy.

Source: own processing

5. Results and discussion

Literature has provided extensive deterministically of statistical methods for assessing the business diagnosis. Over time, due to the unprecedented economic evolution and the scientific and technical revolutions that marked the beginning of the third millennium, these methodologies become more or less efficient in determining the prediction of risk bankruptcy. Even with the advantages of statistical models, we must be very careful when we used these methods. Just because for a better accuracy of failure prediction, the bankruptcy risk predictions model have to be created on the space and time in which the company under review operates. The sector of activity in which the company operates is also an extremely important criterion for a bankruptcy risk model. Among the most used financial ratio we found: profitability ratio, leverage ratio, cash flow ratio, size activity.

Any model of bankruptcy risk, no matter how well is founded, in terms of the techniques used, does not lead to a successful prediction rate of 100%. Therefore, for a best prediction of risk bankruptcy, any manager (or any user) should be use both on bankruptcy risk models developed by statistical techniques (which have the advantage of providing information very fast) and deterministic models based on SWOT analysis combined with evaluation grids methods (which have the advantage of an exhaustive and complete diagnosis).

Based on investigated the literature, we design our own modern model of assessing a business diagnosis under a FESG score type (Economic/Financial, Environmental, Social and Governance). This score has the advantage that encapsulates all the main approaches which characterize the global performance of the company not only the financial side but also the other three important sides of the company sustainable development (Environmental, Social and Corporate Governance)

6. Conclusions

The beginning of the XXIst century brings new approaches to organization performance, so performance begins to be defined according to the value it creates for all stakeholders. Therefore, the models of diagnose and predict the future of business identified in literature need to be reevaluated. For this objective, in our present work we propose a deterministic model for diagnosis the business performances, based on the current needs imposed by the requirements of a sustainable development economy.The proposed model is based on assessing a FESG score type (based on four pillars of sustainable development (Economic/Financial, Environmental, Social and Governance).

So, we extend the Triple Bottom Line approach introduced by Elkington (2002) with Quadruple Bottom Line, by adding in our score besides the economic/financial, environmental and social dimensions, a fourth dimension which is corporate governance. Maximizing economic, social and environment performances can be done only in the context of good collaboration at the level of corporate governance structures through which conflicts of interest are diminished.

Our paper bring value added in literature by making a review of the diagnosis business models and predictive model of bancruptcy risk and by creating our deterministic model of business diagnosis. In our model we used *SWOT method (Strength, Weakness, Opportunities and Threats)* combined with the *evaluation grids method* (based on Likert scale with five levels). Also we have in mind the credit rating methodology used by Standards & Poors or Fitch agecies.

In the future research we intend to test our model on the sample created for Romanian companies, by sector of activitity and by size activity.

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