DEVELOPING THE CREDIT SCORE MODEL THROUGH THE COMMON USE OF FINANCIAL AND QUALITATIVE INDICATORS IN THE EVALUATION OF CREDITWORTHINESS

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Povzetek The developed credit score model represents an innovative and advanced way in the credit rating process that uses both financial and qualitative indicators in estimating creditworthiness. in order to develop the model a research has been carried out in the croatian banking sector and among the consulting companies involved in the process of creditworthiness. the model has been developed based on the findings and conclusions from the conducted research and contributes in the economic science, specifically in the field of innovation and competitiveness.

The balance sheet data and the indicators originating from the financial statements can be used to determine how a company was performing in the past and how successful it was. But this information tells us very little about the quality of management, market share, company plans, production process, organizational structure, etc. and nothing about the directions in which the company is developing.

This means that during the process of evaluation of creditworthiness a risk analyst needs much more information than the annual financial statements can provide. That is why qualitative factors must be also considered when estimating creditworthiness.

The aim of this paper is to research the importance of the common use of the proposed qualitative and financial indicators in the process of estimating creditworthiness, and, in addition, to propose a model based on the resulting research findings. In the proposed credit score model, the final credit rating is determined by the synthesis and common scoring of financial and qualitative indicators, which ultimately reflects internal and external factors that directly affect the operations of any business entity.

The proposed model will certainly allow a simpler and better rating score of small, medium and large companies, and with its simplicity it will contribute to the analysis of each business entity.

In the model itself, the optimal choice of financial and qualitative indicators and their weighted values were used to make a more reliable credit rating score considering the internal and external factors affecting the business.

Determining credit rating by applying financial and qualitative indicators provides comprehensive and credible information about the business entity and its business risks and thus allows the making of punctual and correct business decisions, i.e. wrong business decisions are prevented.

Ključne besede: business analysis, creditworthiness, financial indicators, qualitative indicators, credit rating, credit score model, company.

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1 Introduction

To assess a company's creditworthiness means to evaluate its "health", its ability to survive in the long term[1]. Credit rating is meant to be a rating that can be assigned to an entrepreneur based on an assessment of various measurable (internal) and unmeasurable (external) data and information. Business risk assessment is an unavoidable term in the daily business of every entrepreneur.

One of the motives for estimating creditworthiness is the evaluation of current and future business risks that may occur. Higher risk together with a poor credit rating score requires a faster and decisive response, and even unpopular measures to eliminate it.

The current situation in the Croatian economy caused by inadequate risk management and incomplete approach to business analysis is reflected in high financial losses, many pre-bankruptcy agreements and bankruptcies, and the liquidation of business entities. Furthermore, the inadequate competences of the management structures, the non-transparent legal system, high indebtedness and impaired liquidity are some of the biggest problems. As a result of the failure to resolve them, the unpaid liabilities continuously increase and create serious problems for all business entities as well as for the whole Croatian economy. Therefore, information on financial management, business risks and credit rating are crucial for making quality decisions and for the successful operations of any business entity.

Considering the complexity of each business entity's operations, and the importance of many internal and external variables that affect its business, there is a need to use an appropriate methodology in assessing creditworthiness, which, in addition to financial indicators, will appropriately evaluate the impact of external or non-financial factors and thus contribute to a more reliable credit rating score. Analysis of non-financial factors affecting the business of any company is called qualitative analysis of a business.

In this paper, the research is done on whether the qualitative and financial indicators are used in the credit rating process in the financial sector in the Republic of Croatia,

[1] Leko V., Procjena boniteta trgovačkog društva, Zagreb, Masmedia, 1996., page. 10.

their importance is determined, and a model is proposed which will provide a more reliable and comprehensive credit rating by synergically using financial and qualitative indicators.

In the process of determining the credit rating score model, selected qualitative and financial indicators were used. The corresponding weights were assigned to them based on the importance which they have on the business performance of the company so that they could be quantified into a credit rating calculation. The importance of each indicator was assigned based on the conclusions of the conducted research.

2 Basic features and aspects of creditworthiness

All the information for the calculation of financial ratios was derived from the financial statements for the previous several years. Based on the balance sheet and profit and loss account, as well as the indicators derived from them, it can be determined how successful the company has operated in the past and how it currently operates, but it does not provide us with any information on the quality of management, market share, facilities and equipment, etc. The credit rating score based on the financial statements includes information on liquidity, profitability, indebtedness and other selected indicators.

Even if the data from the balance sheet indicate that a company is performing smoothly, the influence of external factors can very quickly lead the company to serious problems and condemn it to failure.

Qualitative analysis involves processing the business from "unmeasurable" values, such as management, ownership structure, market share, production process and organization, etc., essentially factors that cover other aspects of business besides the financial ones.

Qualitative data analysis: analysis of the environment, analysis of management expertise, analysis of market share, strengths and weaknesses, risks and opportunities, are the basis for evaluating the present, and the future business of each entrepreneur specifically.

Including financial and qualitative indicators in the final credit rating score gives a better and more complete picture of the company's business, which, in addition to the standard financial indicators, points to the importance of other factors that directly affect the company's operations.

Qualitative factors mean all information that is not covered by accounting information about an enterprise (group of companies).

In today's economic practice, very often, under the influence of non-financial factors (change of ownership structure and management, change of law, political instability, etc.), the business picture of the company can completely change in a very short period, which can lead to the collapse and liquidation of the company itself.

3 Research methods

More scientific methods were used in this scientific paper. Interviews, analysis, synthesis and descriptive methods were used to determine financial and qualitative indicators, evaluate individual indicators concerning the specifics of the Croatian economy, and the impact of each indicator in reaching credit rating.

In this paper, inductive and deductive methods lead to insights that are important for the credit score model development. By applying mathematical methods, formulas and symbols, a credit rating model was developed. In addition to the relevant domestic and foreign literature, numerous secondary sources of data related to the topic were also used in this paper, such as business journals, official bank publications and business websites.

4 The research and selection of the qualitative and financial indicators to use in the credit score model

4.1 Selection of financial and qualitative indicators for a more credible credit score model

As is the case with financial indicators, so is the case with qualitative indicators, the selection of chosen indicators is subject to a systematic assessment when determining credit rating.

The proposal for financial and qualitative indicators, which has been covered by the research to develop the model for estimating creditworthiness, is shown in Tables 1 and 2[2].

Table 1: Proposal of qualitative indicators

1. Management
2. Ownership structure
3. Market and market position
4. Facilities, equipment and branch of activity
5. Accounting and reporting
6. Legal regulation

Source: Created by author

Table 2: Proposal of financial indicators

1. Return on equity
2. Profitability
3. Asset turnover
4. Debt ratio
5. Liquidity ratio
6. Interest cover

Source: Created by the author

It is important to emphasize that these twelve indicators do not fully cover the information needed for the overall creditworthiness assessment since there is an almost endless number of indicators used in determining creditworthiness.

[2] The author has suggested the most important qualitative and financial indicators based on his up-to-date research and his own experience.

4.2 Sample description and research method

The research was conducted from September 2019 to November 2019, on a selected sample of 18 companies in the Croatian financial industry which business activities are related to business analysis.

Considering the very limited application of credit rating scoring in the Croatian economy, the research was conducted at a basic set consisting of almost all the banks (22) and 4 leading consulting companies in the Republic of Croatia.

From the basic set, a sample of 14 largest banks in Croatia was selected with their assets exceeding 95% of the total assets and 97% of the market share in Croatia, and the 4 leading consulting companies in Croatia.

The compatibility of the sample structure according to the reported characteristics with the structure of the basic set can be accepted since it is generally known, as well as based on secondary sources, that credit rating scoring within their activity in Croatia is mostly performed by banks and only by a small number of consulting companies. Considering the share of banks' assets in the sample of 95% of the total assets of the banking system in Croatia and also the fact that 9 out of 14 financial institutions answered the questions in the interview, the sample can be considered representative and based on it, it is possible to make appropriate conclusions related to the basic set.

Among the 18 business entities contacted, 13 of them gave feedback which represents a response rate of 72%. Nine of the given answers refer to banks in Croatia and four to consulting companies. The total response rate of 72% can be considered relevant for further research, so the author continued with further analysis.

Data were collected by interviews. The mentioned interview was used to research the basic data about the use, impact and importance of qualitative and financial indicators when evaluating creditworthiness. The interview consisted of 5 closed-ended questions and 5 possible answers for each question to gather the answers as soon as possible and to be as accurate as possible. The aim of the questions was to determine whether the qualitative indicators were used in the rating estimation, whether they were used together with the financial indicators, and to determine the relevance of the proposed qualitative and financial indicators in order to determine the model for the evaluation of the final credit rating.

The questions for the interview research were designed to provide closed-ended answers, which were shown on a Likkert scale with 5 possible answers. The Likkert scale was also used for assigning the appropriate score points for each given answer.

The Likkert scale made it possible to group the answers into two basic groups: completely and generally agree (points 4 and 5), and completely and mostly disagree (points 1 and 2). By grouping them, it was possible to accurately analyse the results of the research. In the end, based on the answers grouped in such manner, quality and reliable conclusions on accepting the thesis can be made.

5 Results of the research

The research was intended to determine whether the proposed qualitative indicators, in addition to the financial indicators, are used in credit rating estimation, and to determine the importance of each indicator in the scoring of the final creditworthiness. The study was conducted to establish a credit rating model that would include financial and qualitative indicators and their weights of importance.

Companies dealing with credit rating judge differently the individual relationships of financial and qualitative indicators, and they also do not give the same importance to all indicators when assigning the final credit rating score.

Firstly, the intention was to research whether qualitative indicators, in addition to the usual financial ones, were used in the rating assessment.

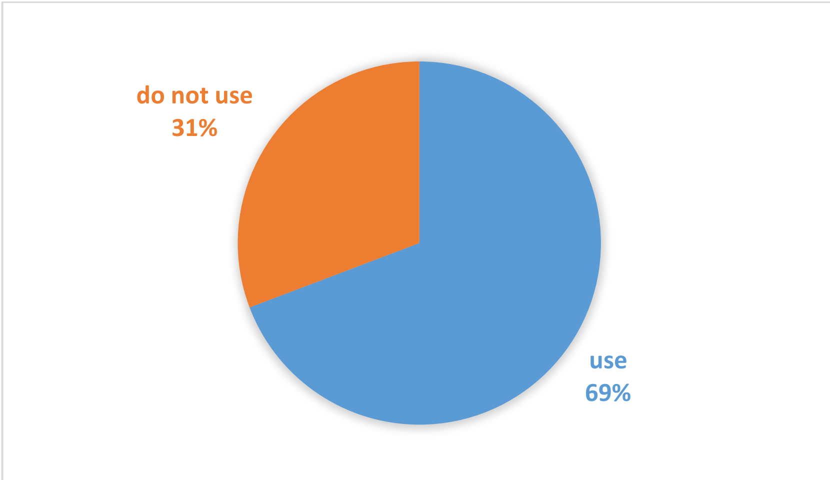

Chart 1: Comparative use of qualitative and financial indicators in determining creditworthiness

Source: Author research

The achieved results indicate that 69% of the interviewed business entities comparatively use qualitative and financial indicators in a credit assessment process, while 31% do not use them, but only use the financial ones. The final credit rating of business entities that only use financial ratios is not comprehensive and reliable. Using such an evaluation of credit rating makes it very difficult to assess the present business risks and to predict the impact of external factors on the company's business, which represents the biggest imperfection.

It is also important to note that the largest number of interviewed subjects, 9 of them, use a comparative analysis of qualitative and financial indicators in which qualitative indicators make a further contribution to the final assessment of creditworthiness. Only 4 business entities do not use qualitative indicators and are not able to perform comparative analysis, so it can be concluded that the final credit rating score of these businesses is not complete and reliable.

Table 3: Structure of business entities concerning the use of qualitative indicators in rating

	Banks	Consulting companies
Use/mostly use	7	1
Do not use/mostly do not use	2	3
In total	9	4

Source: Author research

Based on the previous conclusion, the further intention was to research whether the proposed qualitative indicators are used in the credit rating process.

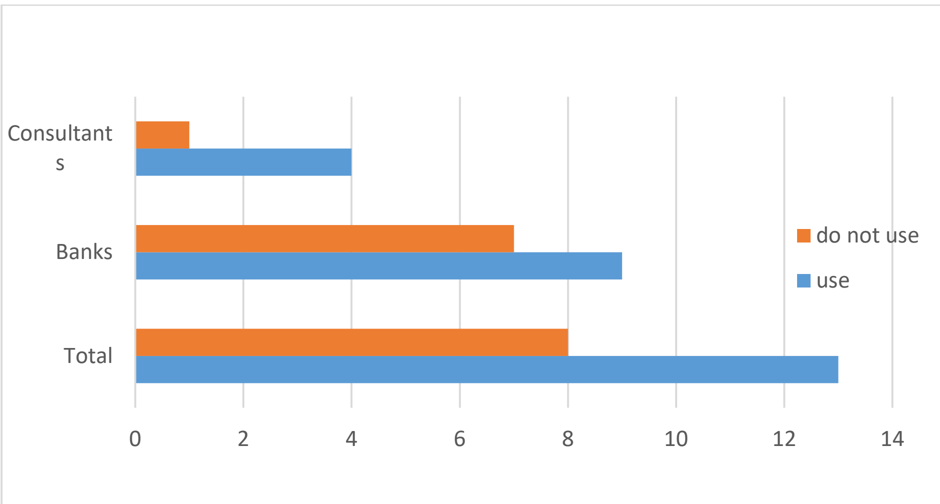

Chart 2: The use of proposed qualitative indicators in the credit rating process
Source: Author research

The obtained results indicate that 8 out of 13 interviewed business entities use the proposed qualitative indicators in estimating creditworthiness, while the remaining 5 do not use them and use only the financial ones. A more detailed analysis of the results shows that 7 out of 9 interviewed banks use all the proposed qualitative indicators, while only 1 of 4 consulting companies use them in their credit rating process.

It is also important to emphasize that the use of both types of indicators also implies the use of a more sophisticated credit rating model, and one can notice that today almost all interviewed banks use such models to evaluate creditworthiness, while consulting companies still rely on models that predominantly use simpler analytical credit rating procedures, almost entirely ignoring the impact of other factors. That can be expected since the banking sector uses advanced technology and models to assess credit ratings when granting loans to entrepreneurs, which directly affects the quality of the loan portfolio and the bank's business performance.

According to the previous conclusion that not all interviewed entities use the proposed indicators in assessing creditworthiness, the intention of the further research was to determine whether they consider that the said indicators should be used.

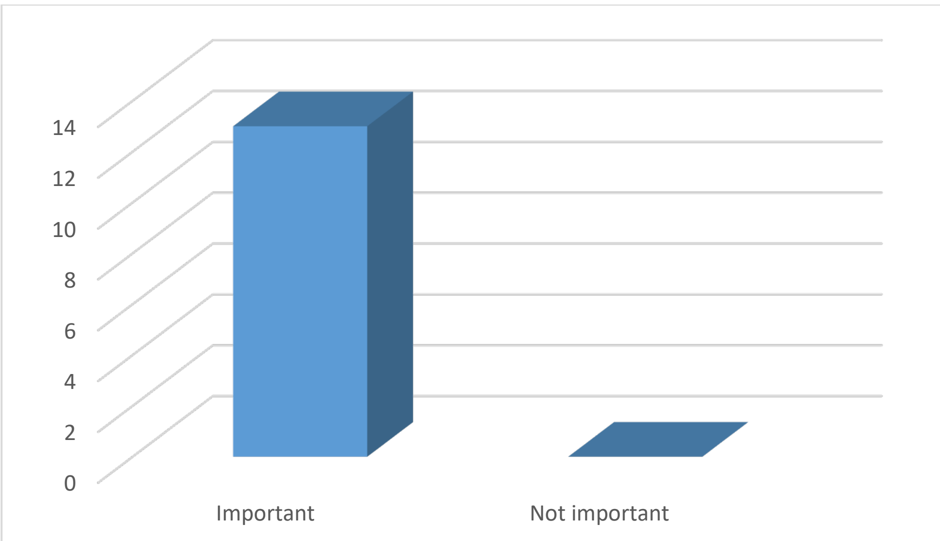

Chart 3: The necessity of using the proposed qualitative and financial indicators in assessing creditworthiness

Source: Author research

Based on the above chart, it can be concluded that the comparative use of qualitative and financial indicators is necessary for a reliable assessment of creditworthiness. The results in absolute terms indicate that is necessary to include an assessment of the influence of the qualitative factors, in addition to the already established analysis of financial indicators within the approach to determine credit rating, in order to try to evaluate the company's operations more reliably.

Considering the research findings, it can be concluded that the proposed indicators should be included in the credit rating scoring model in order to be able to establish a more reliable credit rating score.

In the end, considering the conclusions of the carried-out research, the intention was to examine the importance given to each of the proposed indicators.

The testing of the importance of qualitative factors was conducted according to the school grading system, so the subjects in the research were offered grades from 1 to 5 for each indicator.

5: Extremely important
4: Very important
3: Important
2: Important enough
1: Unimportant

In Table 4, the ratings assigned for each indicator by all the respondents are presented and at the end of the table, the average rating for each indicator has been calculated.

Table 4: The grade of the importance of qualitative indicators

Indicator / rating	5	4	3	2	1	Average grade
Management	13	0	0	0	0	5,00
Ownership structure	3	7	3	0	0	4,00
Market and market share	1	8	4	0	0	3.77
Facilities, equipment and branch activity	4	9	0	0	0	4.31
Finance and reporting	1	5	7	0	0	3.54
Legal regulation	1	6	6	0	0	3.62

Source: Author research

Based on the collected responses and the average rating calculation, it is evident that the greatest importance is given to the management, followed by the facilities and equipment, ownership structure, market and market share, legal regulation, and finance and reporting. It is important to emphasize that management received the highest score of 5 among all the respondents, which indicates that management is considered the most important indicator when assessing the rating of each company.

The highest weight is given to the management (quality of management board) because it is widely known that a quality partner is not only the one who can meet his obligations but is also willing to do so. Management is also of great importance in rating models used in other most developed countries in the EU.

The ownership structure has also been given a highest average grade, since a number of non-transparent privatizations have been conducted in Croatian economic practice, and foreign capital of dubious character is often allowed. The non-transparency of ownership structure is extended to medium and small companies, which made the risk of non-transparent and clear ownership structure very significant.

The market position has also a significant average grade, as a larger market share indicates a stronger force for imposing conditions and dictating prices.

The risk and characteristics of an industry branch are assessed based on experience in the analysis of the individual branches and their cyclicity and are accordingly classified into risk categories. In Croatia, energy, government and financial institutions are most often considered to be the least risky branches, while production and agriculture are considered riskier.

Legal certainty is an indicator that should not be left out in the estimation of creditworthiness in Croatian economic practice, considering the non-transparency and frequent changes in legal regulation. The mentioned political and legal defects are constantly addressed by the representatives of the MMF, as well as the representatives of the global consulting firms Standard & Poors, Moodys, which perform a rating assessment of the Republic of Croatia every year.

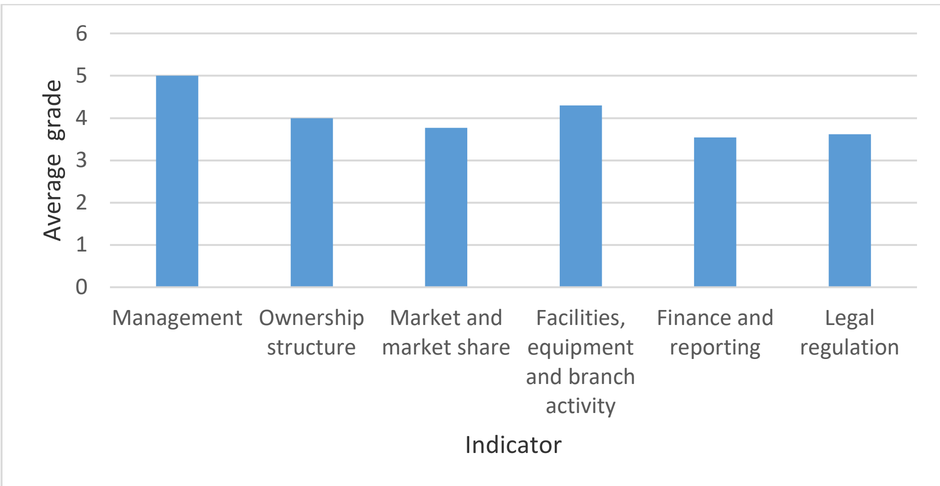

Chart 4: The importance of qualitative indicators in determining creditworthiness
Source: Author research

The results of the study show that all respondents gave the highest rating of importance of 5 to management; after management, the highest average rating was given to facilities, equipment and industry with the indicator of 4.31, followed by ownership structure with 4, market and market share with 3.77, legal regulation with 3.62 and finance and reporting with 3.54.

It is evident from the previous overview that no indicator has received an individual rating of less than 3 (important), which indicates the necessity of their application in the credit rating model.

The same evaluation method and technique were used to evaluate the relevance of each proposed financial indicator.

Table 5: The grade of the importance of financial indicators

Indicator / rating	5	4	3	2	1	Average grade
Return on equity	3	7	3	0	0	4.00
Profitability	3	7	3	0	0	4.00
Assets turnover	1	5	7	0	0	3.54
Debt ratio	5	5	3	0	0	4.15
Liquidity ratio	7	6	0	0	0	4.54
Interest cover	2	7	4	0	0	3.85

Source: Author research

The results of the research show that the highest average rating was obtained by the liquidity ratio of 4.54, followed by the debt ratio with 4.15, then the return on equity ratio with 4.00, profitability also with 4.00, interest cover with 3.85, and the assets turnover with the ratio of 3.54.

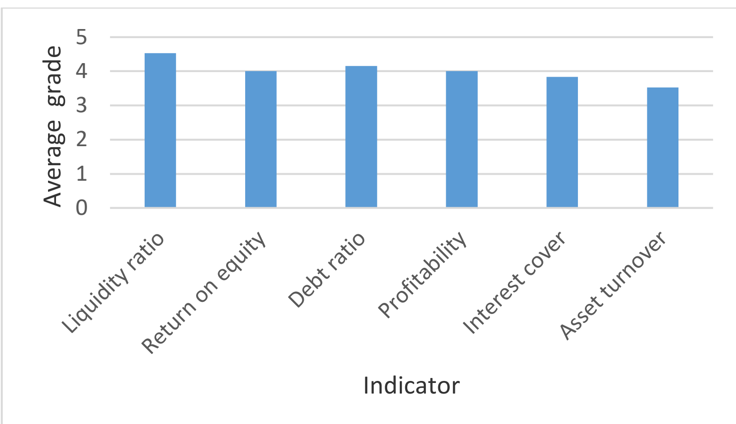

Chart 5: The importance of financial indicators in determining creditworthiness

Source: Author research

In this research none of the proposed financial indicators also received a rating of less than 3 (important), which indicates the importance of using them in the credit rating process.

From the obtained results, it is possible to confirm the assumption that a comprehensive and reliable credit rating can be determined by the comparative use of qualitative and financial indicators, and that the final credit rating score is determined by their optimal combination.

The results place additional requirements on companies dealing in credit rating business. The research is done to determine the most appropriate ratio of qualitative and financial indicators in assigning the final credit rating to the specificity of the Croatian economy and its environment and it ultimately indicates the need to identify a credit rating model that will use the proposed indicators and their weighted values.

Global consulting companies such as Moody's, S&P continuously adapt their credit rating models that reflect changes in the market and the importance of qualitative factors.

After the importance of each of the proposed qualitative and financial indicators has been identified through research, as well as their role in the credit rating process, an appropriate model is furthermore proposed. It quantifies the credit rating score considering the research conclusions from this paper. Identifying a model that estimates a final rating using weighted values of the proposed qualitative and financial indicators contributes to the calculation of the most reliable creditworthiness.

6 The credit score model for evaluation of creditworthiness

The credit score model represents a set of parameters based on which the credit rating is made. Parameters can be indicators that affect business risk and such indicators are assigned with specific weights that show the importance of each indicator in the model.

When selecting the indicators to be included in the model care must be taken to ensure that the desired data is available. Models usually express a credit rating in the form of a number that expresses some value which is generally placed between the lowest and highest offered value.

The objective of the proposed model is to provide a more credible rating which easily uses the weighted values of the included indicators.

The values of the qualitative indicators and their weights are included in the proposed model based on the specific business and business environment conditions in the Republic of Croatia and as well as the previously conducted empirical research in Croatian banks and consulting companies, that analyse the quality of entrepreneurs' business.

The financial indicators are standardized and as a contribution to the proposed model, qualitative indicators are added, and the value and weighting of all indicators in the model are also determined.

It is important to emphasize that the total value of the weights is 100% and that 50% refers to quality indicators, while the remaining 50% refers to financial indicators.
The above methodology is generally accepted in developed economies of the world, most often relying on the credit rating methodology proposed by world-renowned consulting companies of which the most widely used methodologies are the ones developed by the US consulting company Standard & Poor's[3].

In a credit rating scoring model, the probability of default is usually presented in the form of a rating score. The higher score refers to a lower probability of default.

Accurate and predictive credit rating scoring models help maximize the risk-adjusted return of a financial institution. However, markets and consumer behaviour can change rapidly during economic cycles, such as recessions or expansions. For this reason, risk managers or credit analysts need not only to create the models but also quickly adjust and validate them.

[3] Standard & Poor's has been operating for over 80 years and is also synonymous with independent and quality credit rating of companies and banks worldwide https://www.standardandpoors.com/en_US/web/guest/ratings/ratings-actions

The following is the proposal of the credit score model for creditworthiness evaluation:

The first column lists the most important qualitative and financial indicators;

- The second column gives weights for the importance of each indicator;
- The third column shows the evaluation criteria for each indicator;
- The fourth column is provided to evaluate each indicator;
- The fifth column gives the final value for each indicator, representing the multiplication of the weights and the ratings of the indicators.

Indicator	Weight	Valuation criteria	Rating	Value
Qualitative indicators				
Management quality	15.00%	5 (excellent) - 1 (poor)		
Ownership structure	9.00%	5 (excellent) - 1 (poor)		
Market/market share	7.00%	5 (excellent) - 1 (poor)		
Facilities, equipment and branch activity	11.00%	5 (excellent) - 1 (poor)		
Finance and reporting	3.00%	5 (excellent) - 1 (poor)		
Legal regulation	5.00%	5 (excellent) - 1 (poor)		
Financial indicators				
Return on equity: Net profit/equity + reserve	8.00%	> 35% -------- 5 > 25% -------- 4 > 15% -------- 3 > 10% -------- 2 < 10% -------- 1		
Profitability: Ebit/operating income	8.00%	> 5% ------- 5 > 3% ------- 4 > 1.5% ---- 3 > 0% ------- 2 < 0% ------- 1		
Asset turnover	5.00%	> 7 ---------- 5		

Total income/total asset		> 5 ---------- 4 > 3 ---------- 3 > 1 ---------- 2 < 1 ---------- 1		
Debt ratio Total liabilities/total assets	10.00%	< 30% ------- 5 30-45% --- 4 45-65% --- 3 65-80% --- 2 > 80% ------- 1		
Liquidity ratio Short term assets/short term liabilities	13.00%	> 2 --------- 5 > 1.5 ------- 4 > 1.10 ----- 3 > 0.85 ----- 2 < 0.85 ----- 1		
Interest cover Ebit/annual interest expenses	6.00%	> 8 ----------- 5 > 6 ----------- 4 > 4 ----------- 3 > 1 ----------- 2 < 1 ----------- 1		
Sum of indicators	**100%**			

Source: Created by the author[4]

[4] The assigning of weights to the indicators was done using the author's research in combination with the Standard & Poor's Corporate Methodology https://www.spratings.com/scenario-builder-portlet/pdfs/CorporateMethodology.pdf

7 Conclusion

Ignoring the impact of non-financial factors on the company's operations may result in an inappropriately low assessment of potential business risks, which ultimately results in the inadequate and insufficient implementation of the overall credit rating process.

The confirmation of the assumption that a comprehensive assessment of creditworthiness requires the use of qualitative and financial indicators is provided by research showing that 69% of the interviewed Croatian business entities use both types of indicators in the rating process.

The research also confirms that it is necessary to use the indicators proposed in this paper to obtain a credible credit rating score, and this opinion prevails in 100% of the interviewed business entities.

Further research shows the importance given to each of the proposed indicators. The results show that the highest importance is given to management for the qualitative indicators, while for the financial indicators the highest importance is given to the liquidity ratio.

Based on the reached conclusions about the importance of the proposed indicators and the necessity of their common use in the credit rating process, the intention was to propose a credit score model.

In the proposed model, the final credit rating score is determined by the synthesis and common scoring of financial and qualitative indicators, which ultimately reflects financial and other non-financial factors that directly affect the operations of a business entity.

The contribution of this work to scientific discipline lies in the common scoring of weighted qualitative and financial indicators, and development of the model that allows a more reliable credit rating score using both type of indicators.

The paper can also be used to train and educate financial analysts and consulting companies, focusing their attention on the analysis of qualitative factors of a business entity in addition to the usual analysis of financial indicators.

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