
A COMPANY'S CREDIT RATING IN SLOVENIA: METHODOLOGY AND CASE STUDY

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Abstract

A company's ability to pay back its obligations was the main purpose of the credit rating at first, but it nowadays takes into account a wider range of elements. It relates to evaluating business excellence, the reliability of the organisation, its public reputation, and the supervision of business partners. A company's credit or financial rating is determined by analysing the financial performance of the preceding fiscal year. The research relies on a qualitative methodology, using a case study approach to calculate and compare the credit rating using three credit rating scores from Slovene rating agencies. The credit rating research is conducted by using accounting data extracted from financial statements. Every credit rating agency has certain criteria or indications to determine the credit rating. We understand that the credit rating score has been determined by the number of financial indicators or ratios used to calculate credit rating.

Key Words

Credit rating; methodology of credit rating; business indicators and ratios; calculation of credit rating.

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INTRODUCTION

The term "credit rating" originates in Latin words "credo" (believe, trust) or "bonitas" (benefit, goodness, justice, excellence) and thus reflects the positive qualities of someone (a legal or natural person) or something (a receivable, securities). Credit rating determines the quality or value of an individual, company, things, or land (Knez-Riedl, 1998, p. 18–19).

The paper aims to review the differences in credit rating methodology used by Slovene credit rating agencies and assess their credit ratings. The research examines the impact of various corporate credit rating calculations and the impact on the credit rating calculation due to the changes in indicators from financial statements. Because the effectiveness of financial markets depends on the accuracy of ratings, stakeholders need to understand the issuers' actual creditworthiness. (Klusak et al., 2024, p. 2).

Sovereign credit ratings are important for a country or a company since they imply its (credit) risk and impact the cost of financing. Therefore, we would expect that a sovereign credit rating is assigned based on thoroughly developed criteria and is supported by data. (Slapnik & Lončarski, 2023, p. 1) Unconscious and implicit biases can nevertheless affect credit rating agencies' ratings despite their best efforts to provide impartial, independent, and objective assessments of issuers' creditworthiness. (Slapnik & Lončarski, 2023). Sovereign ratings involve gathering not only hard (objective) data but also soft (subjective) information (Fitch, 2024; S&P Global, 2019). Our paper will review the methodology and calculations for hard or objective data used in credit rating calculation.

The definitions of a credit rating are still not unified today. There is no industry definition or standard to describe credit ratings nor is there a trade association of credit rating agencies (Langohr & Langohr, 2012, p. 23). There are the traditional and modern notions of credit ratings, as shown in Table 1.

Table 1: Concept of credit rating

	Traditional approach to company credit rating	Modern approach to company credit rating
Time horizon	Focused on the past	Focused on the future
Factors	Quantity	Quality
Targeting	Threats	Opportunities
Method	Financial analysis	SWOT
Tools	Financial indicators	Less common indicators

Source: Nemec, 2000, p. 498.

A credit rating relies on analysing various financial indicators, business data, balance sheets, profit and loss statements, cash flow statements, and other relevant information about a company. Important factors to be taken into account when assigning a credit rating include (AJ PES, 2023):

- the financial health of the company,
- business risks,
- past payment behaviour,
- comparison with the industry.

A credit rating, therefore, has a dual function – on the one hand, it is a motivator because companies want to build a good reputation and get the highest possible rating, which opens the door to doing business and allows it to be considered a trustworthy company. On the other hand, a credit rating is an excellent risk indicator when an organisation is cooperating with a company for the first time or is unfamiliar to it as the rate can make it easier to protect an agreement with an additional contract (Achilles, 2015).

It is crucial to remember that credit ratings might differ between countries. Therefore, when engaging in international commerce, one must consider credit ratings relevant to the country, area, industry, or activity. This facilitates a more accurate assessment of the creditworthiness and reliability of a foreign business partner (Apšner, 2023).

Credit rating agencies assign ratings to businesses based on their long-term basic credit strength or how likely they are to fulfil their debt payment obligations over the long run. More precisely, ratings pertain to an obligor's overall creditworthiness or duties concerning specific debt security (subordinated and senior bonds, secured or unsecured, collateralised loan arrangements) or other special financial commitments (González et al., 2004, p. 3).

Credit rating agencies are service companies that are linked to financial markets. They are economic operators that draw up independent opinions on the creditworthiness of a particular entity. They are engaged in the external rating of the credit rating of companies, banks, insurance companies, and others. They form an industry that has developed gradually and has been important for many years (Knez-Riedl, 2004).

Today, the global credit rating agency industry is highly concentrated, with the three agencies ("the Big Three") controlling almost the entire market. These three agencies are Moody's, Standard & Poor's and Fitch. Together, they provide services to borrowers and lenders and provide the market with reliable and accurate information about the risks associated with certain types of debt (Finney, 2023). The rating market is an oligopoly system of imperfect competition in which a few companies, namely three agencies, control the market (Proença et al., 2021, p. 405).

The rating agencies assess the ability of entities to pay their debts and consider a range of underlying factors concerning financial capacity, composition of assets and reputation of the issuer, forecasts, macroeconomic factors, bankruptcy history, and economic cycle (De Moor et al., 2018).

In Slovenia, the need to process data on business entities arose relatively late, in the late eighties, with the beginning of entrepreneurship. The credit rating activity for external clients appeared for the first time in 1989 at the Social Accounting Office, the forerunner of the Agency of the Republic of Slovenia for Public Legal Records and Services (AJPES). The basis for producing credit information was financial statements and records of payment transactions. In addition, banks were also involved in credit rating to assess companies' creditworthiness and risk level (Šturman, 2004, p. 31–32).

Well-known credit rating agencies in Slovenia are:

- Prva bonitetna agencija, d.o.o., which is known for its app eBONITETE.SI and was created due to the need for data that were available in several places or could not be obtained at all, according to the company's methodology, which is also used in the eBONITETE.SI web application, the company's credit rating is expressed with numbers from 1 to 10. The method of submitting a credit rating in this form has an advantage for the user as the financial position of the business partner and the degree of default risk when doing business with it is easily deduced.
- Bisnode with Dun & Bradstreet uses the GVIN.COM application. The agency labels credit ratings with letters from A to E. The letter A indicates the class with the best credit rating, and the letter E indicates the worst.
- AJPES uses the S.BON AJPES method to classify Slovene business entities according to credit risk in 10 grades with credit ratings from SB1 to SB10. The SB1 rating is the best credit rating and the SB10 is the worst credit rating that does not yet imply the occurrence of a default event. The SB10d credit rating is attributed to business entities where a default event occurs.

The paper is structured as follows: a literature review in Section 2 and the used methodology in Section 3. In Section 4, we present a company's credit rating and review the impact of indicators on a company's credit rating calculation in Section 5. Section 6 discusses the reliability and accuracy of credit ratings using multiple data.

LITERATURE REVIEW

Historically, the credit rating agencies were founded as a mercantile credit agency, which rated merchants' ability to pay their financial obligations. Lewis Tappan founded the first rating agency in New York in 1841, after the financial crisis of 1837. The first rating was published in 1859 by Robert Dun, who acquired the first established rating agency. A similar mercantile rating agency was formed in 1849 by John Bradstreet, who published a rating book in 1857. Following the merger in 1933, the two organisations became Dun and Bradstreet, which in 1962 acquired Moody's Investors Service (Cantor & Packer, 1995, p. 11).

By providing an unbiased assessment of creditworthiness, a credit rating can be seen as a link between issuers and borrowers, minimising information asymmetries in the financial system. Since the early 2000s, the credit rating agencies have been under a lot of pressure because of their failure to foresee the fall of WorldCom and Enron in the early 2000s, and their involvement in the 2008 financial crisis (Papadimitri et al., 2020, p. 294).

Credit rating can be understood as the quality or value of an individual, company, things or land (Knez-Riedl, 1998, p. 18–19). Today, a credit rating is information about a company's financial and property condition. Since the 2008–2009 US financial crisis, credit rating agencies (CRAs) have become

increasingly prominent in policy deliberations and received significant media attention. They have been the focus of attention ever since the Eurozone financial crisis broke out in 2010. The three major US-based credit rating agencies, Moody's, Standard & Poor's (S&P), and Fitch, have received nearly all the attention. (White, 2013, p. 94) The credit rating information contributed to the global financial crisis after 2008 due to the massive downgrades by the rating agencies (Baghai et al., 2014, p. 1961).

One of the key thrusts of regulatory action after the financial crisis in the credit ratings space has been to relax barriers to entry and enhance competition. In the United States, the Securities and Exchange Commission has relaxed some barriers to entry and allowed several new CRAs in the US to obtain the Nationally Recognized Statistical Rating Organization (NRSRO) status. The European Union (EU) has gone further and has introduced new requirements as part of the amendments to the EU Regulation on credit rating agencies, the so-called "CRA-III." The new legislation seeks to place a cap on the market share of each rating agency and requires issuers to rotate credit rating agencies periodically (Camanho et al., 2022, p. 2980).

Credit rating says a lot about a company's performance and includes information about its history, management, status, major strategic plans, and organisation (Brvar, 1998, p. 26). Until the credit rating began to be established as a property of a company, this term had applied only to the benefit of persons (according to their position, personality, and profession) and, to a lesser extent, also to things (land, commodities, securities, and receivables) (Knez-Riedl, 1998, p. 19).

Credit rating agencies are independent third parties determining the credit rates of the entity based on financial performance. Credit rating agencies contribute significantly to debt processing and guide lenders on the clients' creditworthiness. Lenders often use information provided by credit rating agencies to decide upon the cost of debt in the form of either interest rate to be applied to debt, or repayment terms (Ubarhande & Chandani, 2021, p. 2).

We recognise the traditional and modern notion of perks. Narrower definitions are typical for the traditional notion of credit rating, which involves highlighting and considering only certain company features, such as liquidity, financial security, and profitability. These features equate the credit rating with the payment reliability of the company. On the other hand, the modern concept also considers the qualities and characteristics of the company and its environment. In the modern sense, the credit rating reflects the quality of operations of a company, which is reflected in reliability, prospects, and success. A newly recognised component encompasses economic, legal, and social responsibility. The topic of social responsibility also includes environmental and moral responsibility considerations. (Knez-Riedl, 2000, p. 19–20) The traditional notion of corporate credit ratings tends to consider events that occurred in the past. The main difference is that the traditional notion considers only numeric factors, while the modern notion also includes so-called "soft adjustments", i.e. qualitative qualities and potentials of the company.

Škrjanec (2009, p. 3) believes that the modern view is an upgrade of the traditional one because, in addition to assessing a company's past business, it also includes opportunities and development strategies for the company in the future. Modern assessment has expanded the range of indicators for such analysis and started using newer analytical methods. We incorporate this in our research.

Credit rating is widely recognised as one of the most critical methods for assessing creditworthiness. Following the 2008 financial crisis, strict financial regulations have emerged (Adegbite, 2018), including a creditworthiness assessment. The literature researching credit ratings highlights three elements: rating models, agencies, and credit ratings, with factors to consider when assigning ratings. Since 2001, 50 per cent of research has been given a tendency to develop a new credit rating model. (Ubarhande & Chandani, 2021, p. 2) In our opinion this could be a result of a non-standardised industry.

Although the three major credit rating agencies with a global footprint are important, they are not the only creditworthiness advisory services available for bond investors who want third-party advice (White, 2013, p. 96) and stocks and, in the last years, for ESG.

In Table 2, we will present the differences in the rating scales of the credit rating agencies and compare domestic and foreign credit ratings. We emphasise that credit ratings are comparable only to a degree, as each agency uses several factors to determine the credit rating.

Table 2: Comparison of credit ratings

Rating Explanation	S.BON	Prva bonitetna agencija	Bisnode	S&P	Fitch	Moody's
The highest rating, the risk level is minimal, and the fulfilment of obligations is high.	SB1	10	1.AAA	AAA, AA+, AA	AAA, AA+, AA, AA-	Aaa, Aa1, Aa2, Aa3
The fulfilment of obligations is high, but there is a perceived long-term risk.	SB2	9	2.AA	AA-		
The fulfilment of obligations is still high, with a low-risk probability.	SB3	8	3.A	A+	A+	A1
An adequate level of safety, the ability to fulfil obligations is slightly weaker.	SB4	7	4.BBB	A-, A	A, A-	A2, A3
Greater sensitivity to potential changes that may lead to lower solvency.	SB5	6	5.BB	BBB+	BBB+, BBB	Baa1
Ability to meet obligations but greater sensitivity to the environment.	SB6	5	6.B	BBB-, BBB	BBB-	Baa2, Baa3

Rating Explanation	S.BON	Prva bonitetna agencija	Bisnode	S&P	Fitch	Moody's
The ability to meet obligations is average, but the situation is unstable.	SB7	4	7.CCC	BB+, BB	BB+	Ba1
The ability to meet obligations is low, with a high level of risk.	SB8	3	8.CC	BB-, B+	BB, BB-	Ba2, Ba3
The situation is ripe for bankruptcy, and the probability of default is very high.	SB9	2	9.C	B	B+, B	B1, B2
Inability to meet obligations.	SB10	1		B, CCC, CC, C	B, CCC, CC, C	B3, Caa1, Caa2, Caa3

Source: AJPES, 2011.

As shown in Table 2, the ratings of Slovene credit rating agencies are comparable to those of major international credit rating agencies. The difference in ratings is observed in the first two classes, where Slovene agencies divide them into two classes, while foreign agencies do not. Among all others, Bisnode differs in the number of ratings, featuring a scale with nine ratings. In the research, we will compare our findings with Slovene rating agency S.BON.

METHODOLOGY

The paper is based on a qualitative research approach with the case study, in line with the suggestions of many researchers of management accounting (Ahrens & Chapman, 2006; Burns, 2014; Kaplan, 1984; Mat et al., 2010; Modell, 2005; Schiller, 2010; Siti-Nabiha & Scapens, 2005; Vaivio, 2008). Some of them even emphasise the use of case studies (Burns, 2014; Burns & Scapens, 2000; Humphrey & Scapens, 1996; Kaplan, 1984; Liguori & Steccolini, 2012; Siti-Nabiha & Scapens, 2005; Steen, 2011). The qualitative case study is a research approach that enables the examination of a phenomenon in its context using a range of data sources, guaranteeing that the problem is examined from multiple perspectives rather than just one, which allows for multiple facets of the phenomenon to be revealed and understood (Baxter & Jack, 2015, p. 544).

The aim of the research was to examine the impact of various calculations of corporate credit ratings and to show the impact of the change in indicators from financial statements on the credit rating calculation.

In the research, we used a qualitative methodology with a case study designed based on three research questions.

RQ1: How do different methodologies for calculating corporate credit ratings differ and affect the final credit rating?

RQ2: How are various factors, such as financial indicators, included in the model of calculating credit ratings?

RQ3: How can the reliability and accuracy of corporate credit ratings be improved using multiple data sources?

Based on the empirical calculation for Company X based on the S.BON AJPES method, which classifies Slovene business entities (companies, cooperatives, and private institutions) according to credit risk in 10 credit grades with credit ratings from SB1 to SB10, where SB1 is the best credit rating, we investigated the impact of changes in indicators on the calculation of the credit rating, being that different rating agencies use different calculation methodologies.

Initially, we reviewed the Company's financial statements, an important basis for determining the credit rating. We analysed the statement of financial position and income statement for FY 2021 and FY 2022. From the statement of financial position, items were used to calculate indicators:

- short-term financial investments, except for loans,
- short-term trade receivables,
- cash and cash equivalents,
- equity
- long-term liabilities and
- short-term liabilities.

From the set of data of the profit and loss statement, the following items were used in the calculations:

- costs of goods, materials and services,
- depreciation, write-offs, or impairments,
- other operating expenses,
- other expenses,
- net profit or loss for the financial year period.

From the above data, we calculated the indicators, which were divided into three subgroups for better transparency:

- the indicators of horizontal financial structure,
- the indicators of efficiency, profitability, and income, and
- the business performance indicators.

Table 3 shows the calculation of horizontal financial structure indicators, namely the short-term coefficient, net working capital, the quick coefficient, the accelerated coefficient, and the mezzanine ratio. The calculations are for the financial year 2022 and the comparison with the industry and financial year 2015.

Table 3: Presentation of horizontal financial indicators

Indicator	Formula
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Short-term ratio)	coefficient (current	current assets/current liabilities
Net working capital		current assets - current liabilities
Accelerated Test Ratio)	coefficient (Acid-	money + receivables + short-term investments/current liabilities
Quick ratio (Cash Ratio)		cash + cash equivalents + marketable securities/current liabilities
Mezzanine ratio (Debt to Equity Ratio)		total liabilities/shareholders' equity

If the short-term coefficient is less than 1, the company cannot cover all current liabilities with current assets. This indicator should be about 2, but in practice, everything depends on the industry in which the company operates. A higher value of this indicator does not always mean better solvency, as it contains some less liquid forms of assets – inventories. The difference between current assets and current liabilities is net working capital, which indicates a company's short-term financial health and operational efficiency. A better measure of solvency is an accelerated coefficient since it contains more liquid assets in the numerator. Most authors believe that the quick coefficient best indicates short-term solvency. Lower coverage of short-term liabilities with liquid assets could mean difficulties in ensuring solvency, but on the other hand, it could mean that a company invests money more profitably. Finally, we calculated an indicator that shows the debt-to-equity ratio. If the ratio is more than 1 means that the financing structure of the company is predominantly debt.

In addition, we calculate the efficiency, profitability, and profit and loss indicators, as shown in Table 4.

Table 4: Presentation of efficiency, profitability, and income indicators

Indicator	Formula
Profitability rate	net profit/total revenue*100
Return on assets (ROA)	net profit/total average asset*100
Return on equity (ROE)	net profit/average shareholders' equity*100
Operating efficiency ratio	operating income/operating costs

The higher the level of profitability, the better, since this means that the company makes more profit per unit of revenue. The net profitability of assets gives information on how successful the company has been in asset management. High values of ROA attract investors because with higher profitability of assets, the risk of financial and business problems is reduced. The net return on equity ratio is one of the most important indicators for owners as it tells how successful management is in asset management (Igličar, 2009, p. 35). Positive ROE indicates a positive result or profit. If the operating efficiency ratio is more than 1, the company has higher operating revenue than the operating costs.

The last group includes performance indicators, as shown in Table 5.

Table 5: Presentation of performance indicators

Indicator	Formula
Debt to financing ratio	$\frac{\text{total debt}}{\text{total liabilities}} \times 100$
Debt servicing (Debt Service Coverage Ratio)	$\frac{\text{net operating income} + \text{write-downs}}{\text{total expenses}}$
Credit Exposure	$\frac{\text{current operating receivables}}{\text{operating revenue}}$
Coefficient of conversion	$\frac{\text{total revenue}}{\text{total average asset}}$
EBIT	$\text{operating revenue} - \text{operating expenses}$
EBITDA Margin	$\frac{\text{EBITDA}}{\text{sales revenue}} \times 100$
Profit margin	$\frac{\text{net profit}}{\text{sales revenue}} \times 100$

The higher value of the debt-to-financing ratio represents a higher risk for creditors, although this financing is cheaper. Debt servicing is an indicator that tells how much cash flow covers expenses. The result means the company makes enough operating profit to cover total liabilities if the coefficient exceeds 1. Credit exposure measures the liquidity of operations. The low value means a lower credit exposure. EBIT tells us what the company's profit before interest and taxes is. The EBITDA margin determines how many units of cash flow a company generates per 100 units of sales revenue.

Based on the calculated financial indicators for the selected Company, it could already be classified in a certain credit rating. However, we decided to obtain a more accurate assessment so below, we defined the so-called soft adjustments or non-financial factors, which are:

- bank account freeze,
- decision on deregistration,
- involvement of the entity in legal disputes (either as a claimant or as a defendant),
- tax non-payer or tax delinquent, and
- payment index (delays in fulfilling payment obligations).



















Based on the calculated financial indicators and the determination of non-financial indicators, we assessed again and determined the credit rating for the company.

COMPANY X'S CREDIT RATING

Dynamic and static ratings calculations were considered when determining the company's credit rating. We found that the company did not have restricted transaction accounts. In 2022, the company was moderately burdened with litigation as the defendant, but otherwise, it has no significant claims in court. Neither were they tax debtors in the year under review. They had no declared claims in insolvency proceedings. The payment index showed satisfactory payment discipline.

Financial institutions also create transition (migration) matrices with which we can analyse credit rating transitions (whether the credit rating will fall or increase in the coming year). However, since credit forecasting is not the research goal, we did not use it when determining the credit rating for Company X. The assessment is shown in Table 6.

Table 6: Dynamic assessment for FY 2022

Dynamic assessment for FY 2022				
Defendant				
Tax defaulter				
Bank account locks				
Payment Index				
Insolvency proceedings				

Legend:

	Very good
	Good
	Average
	Bad
	Very bad
	Incalculable

Then, we calculated the horizontal financial structure indicators as a part of static rating calculation, including the short-term coefficient, net working capital, the quick coefficient, the accelerated coefficient, and the mezzanine ratio. Used financial statement items are presented in Table 7.

Table 7: Financial statement items for FY 2021 and 2022

Financial statement item	2022	2021
Total assets	1.138.308,97	1.123.892,77
Long-term assets	726.850,06	736.336,34
Current assets	411.458,91	387.556,43
Short-term investments	0	0
Total liabilities	1.138.308,97	1.123.892,77
Equity	387.737,32	316.298,28
Provisions and Long-term Accrued Liabilities	6.362,85	10.321,60
Long-term liabilities	313.636,38	370.764,65
Short-term liabilities	430.572,42	426.508,24
Total revenue	2.121.804,78	1.713.169,62
Sales revenue	2.121.069,34	1.712.264,08
Total expenses	2.042.565,52	1.650.846,01

Costs of goods sold	2.037.479,32	1.646.640,51
EBIT	83.590,02	65.623,57
EBITDA	130.385,78	102.299,89

Source: Financial statements of Company X

The calculations of indicators are for FY 2022 and the results are presented in Table 8.

Table 8: Calculation of horizontal financial indicators in FY 2022

Indicator	Formula	Calculation for company X	Industry average
Short-term coefficient (current ratio)	current assets/current liabilities	0,96	1,3
Net working capital	current assets - current liabilities	-19.113	N/A
Accelerated coefficient (Acid-Test Ratio)	money + receivables + short-term investments/current liabilities	0,71	0,8
Quick ratio (Cash Ratio)	cash + cash equivalents + marketable securities/ current liabilities	0,07	0,3
Mezzanine ratio (Debt to Equity Ratio)	total liabilities/shareholders' equity	1,94	1,9

The values of Company X's first ratio indicators, such as Current, Acid-Test and Quick ratio, are less than 1. If the short-term coefficient is less than 1, the company cannot cover all current liabilities with current assets. This indicator should be about 2, but in practice, everything depends on the industry in which the company operates. A higher value of this indicator does not always mean better solvency, as it contains some less liquid forms of assets – inventories.

The net working capital calculation is negative, which means that the company's current liabilities are higher than current assets and there is potential difficulties in the financial health of the company.

A better measure of solvency is an accelerated coefficient since it contains more liquid assets in the numerator. The value of the accelerated coefficient is slightly lower than the current coefficient since inventories represent as much as 27% of current assets. The value shows that in FY 2022, Company X financed 29% of long-term assets with short-term resources.

Most authors believe that the quick coefficient best indicates short-term solvency. As seen from Table 8, this indicator is much lower than the recommended limit of 1. Lower coverage of short-term liabilities with liquid assets could mean difficulties in ensuring solvency, but on the other hand, it could mean that a company invests money more profitably.

Finally, we calculated an indicator that shows the debt-to-equity ratio. At this point, we discovered that liabilities are almost twice as high as the

shareholders' equity. This means that the financing structure of the company is predominantly debt.

Table 9: Calculation of efficiency, profitability, and income indicators in FY 2022

Indicator	Formula	Calculation for company X	Industry average
Profitability rate	net profit/total revenue*100	3,37	N/A
Return on assets (ROA)	net profit/total asset*100	6,32	3,25
Return on equity (ROE)	net profit/average shareholders' equity*100	20,29	10,14
Operating efficiency ratio	operating income/operating costs	1,04	1

Table 9 contains the calculation of efficiency, profitability, and income indicators for financial year 2022. The level of profitability is considered to be: the higher it is, the better, since this means that the company makes more profit per unit of revenue. Company X was profitable because the result was positive. The profitability rate is 3,37, which indicates that the company could do a better job of managing costs.

The net profitability ratio of assets tells us how successful the company has been in asset management. High values of this indicator attract investors because with higher profitability of assets, the risk of financial and business problems is reduced. Company X generated 6,32 units of profit per hundred units of assets.

The net return on equity ratio is one of the most important indicators for owners as it tells how successful management is in asset management (Igličar, 2009, p. 35). ROE is positive for the company under consideration, i.e. the company had a positive operating result. Per hundred units of capital, the company generated 20,29 units of profit.

The operating efficiency ratio is more than 1, meaning that in FY 2022, the company had more revenue than expenses.

The last group included performance indicators, also calculated for FY 2022. Table 10 presents the efficiency, profitability, and income indicators calculations. The calculations pertain to FY 2022.

Table 10: Calculation of performance indicators in FY 2022

Indicator	Formula	Calculation for company X	Industry average
Debt to financing ratio	total debt/total liabilities (total debt + total equity)*100	65,38	N/A
Debt servicing (Debt Service Coverage Ratio)	net operating income + write-downs/total expenses	0,06	N/A
Credit Exposure	current operating receivables/operating revenue	0,13	N/A
Coefficient of conversion	total revenue/total average asset	1,80	0,89

EBIT	revenue – operating expenses	83.590	75.767.730
EBITDA Margin	EBITDA/sales revenue*100	6,15	N/A
Profit margin	net profit/sales revenue*100	3,37	3,7




The debt ratio in financing shows that as much as 65.38% of funds are financed by foreign capital. The higher value of this indicator represents a higher risk on the part of creditors, although this financing is cheaper.

Debt servicing is an indicator that tells to what extent cash flow covers expenses. The result means the company makes enough operating profit to cover financial liabilities. Credit exposure measures the liquidity of operations. The score of 13% is relatively low, which means a lower credit exposure, as the company has fewer open receivables.

The turnover ratio is above 1, which indicates that the company has more revenue than assets and, consequently, a shorter business turnover. For each margin, the higher it is, the more successful the company's operations. By calculating the profit margin, we found that the company generates 3.37 units of net profit per unit of turnover. EBIT tells what the company's profit before interest and taxes is. The EBITDA margin determines how many units of cash flow a company generates per 100 units of sales revenue. In our case, it is 6.15 units.

Table 11 shows the static assessment for FY 2022 shows the horizontal financial structure, cost-effectiveness, and performance indicators.

Table 11: Static Assessment for FY 2022

Static assessment for FY 2022	
Horizontal financial structure indicators	
Cost-effectiveness indicators	
Performance indicators	

The lack of resources implies a fairly high rate of dependence on external sources of financing for the company. The indicators of the horizontal financial structure found that the ratio of current assets to current liabilities indicates a slightly worse situation in terms of short-term solvency. The company does not tend towards credit exposure since the receivables balance is favourable. Other performance indicators are favourable for the company, especially a high asset turnover rate.

Static and dynamic rating indicators indicate a company with an average or medium rating and an elevated default risk. This is more sensitive to possible changes that can lead to insolvency. The calculations were also compared with the results of the economic activity into which the company

is classified (F – Construction). We examined the financial indicators for the construction organisation of the implementation of building projects (according to NACE code in Slovenia, Company X belongs to F41.100). On average, most indicators perform better within the industry, which means that Company X performs slightly worse than comparable companies.

Since the weights by which financial institutions determine an accurate credit rating are a trade secret, we have created our weights for this part of the research. Dynamic and static assessments each have 40 % weights, and an industry impact has 20 %. We then determined the number of possible points the results can score for each data group and the rating scale. For the best credit rating (SB1), the company scores from 1,5 to 15 points. For an SB2 rating, the score is from 12 to 13,4 points, and so on to the worst SB10 score, into which a company is ranked with up to 1,4 points.

To simplify the calculation, we have set a maximum of 15 points for each part of the rating. We compare the calculated indicators with an average industry indicator. For the first set of assessments, i.e. financial indicators, we awarded Company X 10 points out of 15 due to poorer indicators such as short-term and quick coefficients. The dynamic rating yields 9 points out of 15 due to its having a less than outstanding payment index and that the company has already participated in litigation as the defendant. We awarded the company with 60 per cent of the total points. For the last part, i.e., comparing Company X with the industry, six more points out of 15 were added due to low EBITDA, a crucial financial metric for performance measurement, cash flow indicator, debt servicing, and operational efficiency. Below is the calculation of the weighted assessment.

$$\begin{aligned}\text{Weighted assessment} &= s1 \times g1 + s2 \times g2 + s3 \times g3 = \\ &= 40 \% \times 10 + 40 \% \times 9 + 20 \% \times 6 = \\ &= 8,8\end{aligned}$$

According to the rating scale mentioned above, Company X, with a rating of 8.8, is classified in grade (according to the AJPES model) SB5. AJPES (AJPES, 2023) describes the SB5 score as: "The ability of a business entity to settle liabilities is above average but lower than in the fourth grade. Aggravation of the situation in the business environment or other unforeseeable events can put a business entity in a position where it cannot fulfil its obligations. An entity with an SB5 credit rating achieves indicators that reflect risk factors for the occurrence of a default event that the model assessment of the occurrence of an event of default is lower than the average for all Slovene business entities."

IMPACT OF INDICATORS ON CREDIT RATING

Furthermore, we wanted to determine the impact of financial indicators on the credit rating, so we determined the credit rating for the same company for the first year of their operations, i.e. FY 2015. In this case, we excluded the dynamic assessment since the payment index is the same as in FY 2022.

From the statement of financial position and profit and loss statement for FY 2015, static rating indicators were calculated for the last year of operation.

By comparing the results, we found that as many as four indicators showed better performance in FY 2015 from a set of indicators of horizontal financial structure. A worse result is recorded only in the debt-equity ratio. This can be explained by the fact that FY 2015 is one of the first years of the company's operations as compared in table 12.

Table 12: Calculation of horizontal financial indicators in FY 2015 compared to FY 2022

Indicator	Formula	Calculation FY 2015	Calculation FY 2022
Short-term coefficient (current ratio)	current assets/current liabilities	1,23	0,96
Net working capital	current assets - current liabilities	50.108	-19.113
Accelerated coefficient (Acid-Test Ratio)	money + receivables + short-term investments/current liabilities	1,23	0,71
Quick ratio (Cash Ratio)	cash + cash equivalents + marketable securities/ current liabilities	0,09	0,07
Mezzanine ratio (Debt to Equity Ratio)	total liabilities/shareholders' equity	4,32	1,94

Among the indicators of efficiency, profitability, and income, only the level of profitability is inferior for FY 2015, but since the result is positive, it still means that the company was operating with a profit as shown in Table 13. The coefficient of operational efficiency is also slightly lower but still above 1, which means that in FY 2015, the company had more revenue than expenses. ROA and ROE are much better for the first year of business and are among the very important indicators for investors.

Table 13: Calculation of efficiency, profitability, and income indicators in FY 2015 compared to FY 2022

Indicator	Formula	Calculation FY 2015	Calculation FY 2022
Profitability rate	net profit/total revenue*100	2,0	3,37
Return on assets (ROA)	net profit/total average asset*100	13,66	6,32
Return on equity (ROE)	net profit/average shareholders' equity*100	69,76	20,29
Operating efficiency ratio	operating income/operating costs	1,02	1,04




Performance indicators for FY 2015 are also mostly better than for FY 2022. At this point, there are major differences in three indicators that all Slovene credit rating agencies include in calculating the rating. These are debt rollover, credit exposure, and turnover ratio.

Table 14: Calculation of performance indicators in FY 2015 compared to FY 2022

Indicator	Formula	Calculation FY 2015	Calculation FY 2022
Debt to financing ratio	total debt/total liabilities (total debt + total equity)*100	81,21	65,94
Debt servicing (Debt Service Coverage Ratio)	net operating income + write-downs/total expenses	7,82	0,06
Credit Exposure	current operating receivables/operating revenue	0,12	0,13
Coefficient of conversion	total revenue/total average asset	6,96	1,80
EBIT	revenue – operating expenses	31.286	83.590
EBITDA Margin	EBITDA/sales revenue*100	2,37	6,15
Profit margin	net profit/sales revenue*100	0,02	3,37

Based on these findings from table 14, we present the static assessment for FY 2015 in Table 15.

Table 15: Static assessment in FY 2015

Static assessment for FY 2015	
Horizontal financial structure indicators	
Cost-effectiveness indicators	
Performance indicators	

The lack of resources implies a fairly high degree of business dependence on external sources of financing for the company. The indicators of the horizontal financial structure found that the ratio of current assets to current liabilities indicates a good position in terms of short-term solvency. The company is not on the path towards credit exposure since the receivables balance is favourable. Other performance indicators favour the company, especially a high asset turnover rate.

Fulfilment of obligations remains high, but the likelihood of risk is low. In the same way as for FY 2022, here we compared the results with the industry and according to the same weights and scores for FY 2015 by scoring. According to the S.BON model, this rating is SB3 compared to SB5 in FY

2022. AJPES (AJPES, 2023) describes the SB3 score as follows: "The company's ability to fulfil its obligations is high. A company with an SB3 credit rating has indicators that reflect risk factors such that the model-rated probability of the occurrence of a default event is low but higher than in the second grade. Compared to companies with a higher credit rating, it is more sensitive to adverse changes in the business environment."

RELIABILITY AND ACCURACY OF CREDIT RATINGS USING MULTIPLE DATA

To determine how using more data affects the reliability and accuracy of credit ratings, we compared the calculated credit rating with eBONITETA.

In the section History of Company X, we brought up FY 2015 and compared the credit rating with the investigated credit rating. Prva bonitetna agencija d. o. o. rated Company X with 9 for that year, which, according to the S.BON AJPES method, equals the SB2 rating. According to our calculations, the rating is one class lower, SB3 (according to Eboniteta, this is a rating of 8).

Deviations between credit ratings between different credit rating agencies are due to different rating methodologies. We investigated the causes behind the difference between the ratings in our research and those of eBONITETA. The same factors were selected for the dynamic assessment, so these indicators did not affect the rating. A greater divergence arose in the selection of financial indicators. Our calculation consists of three sets of indicators, each with 4 to 6 calculations. When scoring, we evaluated one set and then awarded the total points for a static score. Prva bonitetna agencija established the methodology by using only five financial indicators and determining a static rating based on this. The financial indicators used according to the chosen methodology are the debt ratio in financing, the short-term coefficient, credit exposure, return on assets, and the ratio of turnover of assets. Compared to the investigated calculation, they did not consider the accelerated and quick ratio indicators, Debt-to-equity ratio, Operating efficiency ratio, ROA, ROE, Profitability ratio, Debt coverage, EBIT, EBITDA, and Profit margin.

From this difference, we conclude that the presented credit rating calculation is more accurate and perhaps even more reliable since the static rating was determined according to the results of fourteen indicators, not just five.

CONCLUSIONS

Credit rating is a term that refers to the positive qualities of an individual, company, thing, or land. It determines the quality or value of an entity and can be based on various factors such as financial health, business risks, past payment behaviour, and industry comparison. Credit ratings serve two purposes: as a motivator for companies to build a good reputation and get

the highest possible rating, and as a reliable risk indicator when an organisation is cooperating with a company for the first time or is not well known to it.

Credit rating agencies assign ratings to businesses based on their long-term basic credit strength or how likely they are to fulfil their debt payment obligations over the long run. They form an industry that has developed gradually and has been important for many years. The global credit rating agency industry is highly concentrated, with the three agencies (Moody's, Standard & Poor's, and Fitch) controlling almost the entire market. Rating agencies assess the ability of entities to pay their debts and consider a range of underlying factors concerning financial capacity, composition of assets and reputation of the issuer, forecasts, macroeconomic factors, bankruptcy history, and economic cycle. In Slovenia, the need to process data on business entities arose relatively late in the late eighties, with the beginning of entrepreneurship. The credit rating activity for external clients appeared for the first time in 1989 at the Social Accounting Office, the forerunner of the Agency of the Republic of Slovenia for Public Legal Records and Services (AJPES).

Well-known credit rating agencies in Slovenia include Prva bonitetna agencija, d.o.o., Bisnode, and AJPES. These agencies use various methods to classify Slovene business entities according to credit risk, with the SB1 rating being the best and the SB10 rating being the worst.

Credit rating is a crucial tool for assessing a company's financial and property condition. It provides information about a company's history, management, status, major strategic plans, and organisation. The traditional notion of credit rating focuses on certain company features, such as liquidity, financial security, and profitability, while the modern concept considers the qualities and characteristics of the company and its environment.

The modern view of credit rating is an upgrade of the traditional one, considering both the company's past business and opportunities as well as development strategies for the company in the future. Modern assessment has expanded the range of indicators for analysis and started using newer analytical methods. Credit rating is widely recognised as one of the most critical methods for assessing creditworthiness, with strict financial regulations having emerged following the 2008 financial crisis.

This research aimed to examine the impact of various calculations of corporate credit ratings and the change in indicators from financial statements on the credit rating calculation. A qualitative methodology was used with a case study designed based on three research questions: RQ1: How do different methodologies for calculating corporate credit ratings differ and affect the final credit rating?; RQ2: How are various factors, such as financial indicators, included in the model of calculating credit ratings?; and RQ3: How can the reliability and accuracy of corporate credit ratings be improved using multiple data sources?

Based on the empirical calculation for Company X based on the S.BON AJPES method, the study examined the impact of changes in indicators on the credit rating calculation.

The first research question, RQ1, was: "RQ1: How do different methodologies for calculating corporate credit ratings differ and affect the final credit rating?" The methods, information, and models that various credit rating agencies employ to evaluate a company's creditworthiness vary with regard to corporate credit rating computation. Credit rating results and interpretation may be impacted by these discrepancies. The following factors can most often influence the results:

- dynamic assessment: experts evaluate companies based on various criteria, such as financial stability, risk management, market position, payment index, and the like. Such an approach may lead to subjective assessments that differ between assessors;
- static assessment: is based on analysing figures such as financial statements and other financial matrices. Various accounting indicators and statistical models are used to calculate the rate. Different approaches can lead to different results;
- comparisons: companies can be judged against international standards and comparisons with similar companies. This may lead to divergent rates by geographical area and industry; and
- internal data and external sources: the use of internal company data and external sources, such as credit rating agencies, to assess creditworthiness. The quality and promptness of these resources can affect the accuracy of the assessment.

The impact of different methodologies on final company ratings can be significant. Different approaches can highlight the diversity of aspects of a company and lead to different creditworthiness conclusions. In addition, it is important to remember that credit ratings may also change with the changes in conditions and economic circumstances, which may further affect the interpretation of these ratings. When using credit ratings, it is therefore important to consider the methodology and monitor the different sources to obtain a comprehensive picture of the company's creditworthiness.

The second research question, RQ2, addressed: "How are various factors, such as financial indicators, included in the model of calculating credit ratings?" When calculating corporate credit ratings, various factors, including financial indicators, are used to assess the creditworthiness and risk of a company. Including these factors in the model of calculating credit ratings is the key to obtaining a comprehensive picture of a company's financial condition. The indicators were divided into several groups to facilitate the presentation of results.

We listed the most common financial indicators and demonstrated their inclusion in assessment models:

- liquidity indicators include ratios that measure the company's ability to fulfil short-term liabilities from current assets. High liquidity indicators indicate good liquidity and lower risk;
- debt indicators include ratios that measure the volume of debt versus equity and the company's total assets. Lower rates of these indicators indicate lower financial risk;
- profitability indicators: include profit margin, return on equity (ROE), return on assets (ROA), and other indicators that measure a

company's ability to make a profit. Higher profitability usually increases the credit rating;

- cash flow: cash flow data is important for assessing a company's ability to fulfil liabilities and finance expenditures. Positive operating cash flow indicates better financial stability. Usually, the debt servicing indicator is used for cash flow; and
- macroeconomic environments: some credit ratings also consider the general economic situation since economic conditions may affect the company's operations.

Credit rating models combine these and other factors to create an assessment of the creditworthiness of a company. Each model has its weights and algorithms that affect the final rating. The accuracy and reliability of a credit rating depend on how well the models take all these factors into account and how weights are set for each factor according to the specific industry and company circumstances.

The third research question, RQ3, was: "How can the reliability and accuracy of corporate credit ratings be improved using multiple data sources?" The reliability and accuracy of corporate credit ratings can be improved by using multiple data sources in several ways for the calculation of the credit rating of a company. More data sources provide a complete picture of the company's financial condition, leading to better rates. Here are some ways this can be achieved:

- diversity of data sources: the use of different types of data sources, including company financial statements, credit rating agencies, publicly available information, internal data, and sectoral reports, allows for a better variety of information used in ratings;
- keeping company data updated: Regularly updating data is crucial, as companies' financial conditions constantly change. Up-to-date data provide a better ability to assess the current financial condition of the company;
- use of advanced analytical techniques: using, for example, machine learning and big data analysis, we enable better use of available data to generate estimates. These techniques can uncover patterns and relationships that would be difficult to observe with traditional methods;
- resource weighting: different data sources may have different reliability and importance. When evaluating a company, different sources would be weighted and ranked according to their reliability in order to improve the accuracy of the estimate;
- data comparison: we compare the data between different sources and check whether they are harmonised. Any discrepancies may indicate problems in the financial statements or reliability of certain sources; and
- change control: It is important to keep track of changes in financial statements and other relevant data that may affect the credit rating. Regular monitoring allows assessments to be adjusted on time.

Using multiple data sources, analysis planning, and appropriate tools and techniques can improve the accuracy and reliability of corporate credit

ratings and reduce risks when lending or deciding on business partnerships. As already mentioned, too much irrelevant or inappropriate analysis data can lead to confusion or wrong conclusions.

The research revealed that calculating credit rating is a complex process requiring considering several factors, including past and current financial data, the economic environment, and trends. A literature review showed different approaches to defining credit rating, such as traditional and modern methods. We found that each methodology has advantages and limitations and that the optimal choice depends on the specific characteristics and data availability.

Different methodologies for calculating credit ratings offer different insights into companies' financial stability. It is important to understand that no universal methodology applies to all types of companies. The choice of the right methodology depends on the specific circumstances and objectives of the analysis. We wanted to get closer to the S.BON AJPES method, but the calculations in the paper are not the same since the methods of calculating credit ratings are usually a trade secret. Retrieving all the data we need for the final result is also difficult. Due to the development of technology and the constant change in the company's environment, it is important to adapt and update calculation models.

Credit rating calculation is a valuable process for investors, lenders, suppliers and other stakeholders, as it allows for a better risk assessment and decision to cooperate with the company. Nevertheless, it is important to note that the credit rating calculation is not the only indicator of the company's performance. We also need to consider other factors, such as governance, market competition, macroeconomic situation, and, more recently, sustainability and sustainable business.

In conclusion, we would like to emphasise that understanding the different methodologies for calculating credit ratings and financial indicators is crucial for better risk management and decision-making in the business world. Continuous monitoring and credit rating are crucial for long-term successful business operations. Our research has provided insight into the complexity of the rating calculation process and its impact on stakeholder decisions. Further research may focus on the sustainability aspect of credit ratings, or machine learning and AI scoring.

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