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Discriminant Models as a Tool for Assessing Corporate Bankruptcy Risk*

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Abstract

Many discriminant models have been developed to assess corporate bankruptcy risk, and they are widely regarded as effective tools for the early identification of financial distress. This study aimed to evaluate the impact that the Covid-19 pandemic and the war in Ukraine had on PSB Mrówka sp. z o.o., a Polish company operating in the retail sector. The analysis employed multiple discriminant models, including both Polish and foreign ones. The findings demonstrated that none of the models classified the company as being at risk of bankruptcy during the examined period. Nonetheless, a marked decline in the values of several discriminant functions was observed, particularly in 2022 and 2023, indicating a deterioration in the company's financial condition. Models specifically calibrated for Polish enterprises most consistently reflected this downward trend, while selected foreign models suggested a modest improvement in 2023. Overall, the results indicated that although PSB Mrówka maintained a low level of bankruptcy risk, its financial resilience weakened over time. The study concluded that adverse macroeconomic conditions—including elevated inflation, higher interest rates, and geopolitical instability—exerted a negative influence on the company's financial standing and contributed to a gradual increase in its bankruptcy risk.

Keywords: discriminant models, bankruptcy, financial ratios, forecast

Introduction

Modern enterprises operate in a rapidly changing environment. Their operations are influenced not only by their immediate microenvironment, including competitors, customers, and suppliers, but also by macroeconomic factors. In recent years, we have witnessed the Covid-19 pandemic, which has had substantial impact on the operations of at least some enterprises. Unfortunately, some of these enterprises were forced into liquidation as a result of bankruptcy. Bankruptcy is the legal consequence of failure to repay overdue obligations. It is a procedure initiated by a commercial court when the debtor is found to be insolvent. The process involves the enforcement of claims by all creditors. This means that bankruptcy is a consequence of insolvency.

Although the terms bankruptcy and insolvency are often regarded as synonymous in everyday usage, the literature on corporate insolvency treats these terms separately. According to the Polish bankruptcy law, insolvency is defined as the inability to fulfill monetary obligations in a timely manner, both short-term and long-term horizons. The short-term horizon refers to a situation in which an enterprise has lost the ability to fulfill its due monetary obligations, with delays exceeding three months. The long-term horizon refers to insolvency persisting for more than two years, where the obligations cannot be settled through the enterprise's assets. If the company's management fails to undertake appropriate remedial actions, such as raising additional capital, obtaining a loan, or renegotiating contracts with counterparties, there is a risk of a permanent loss of liquidity, and consequently,

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bankruptcy. In legal terms, bankruptcy is a court procedure designed to satisfy creditors' claim. Upon the declaration of bankruptcy by a commercial court, the company is typically placed into liquidation, and its assets are subject to sale.

This paper aims to assess whether the turbulent environment associated with the Covid-19 pandemic and the war in Ukraine has affected the financial condition and bankruptcy risk of PSB Mrówka sp. z o.o. To achieve this objective, the study employs several discriminant bankruptcy prediction models. It is hypothesized that these events have negatively impacted the company's financial condition, thereby increasing its risk of bankruptcy.

When starting a business by investing capital, entrepreneurs take the risk of losing it. They are uncertain whether their newly established venture will be successful. According to the Polish Agency for Enterprise Development report on the state of the SME sector in Poland, 299,714 companies were established in 2022, and 200,856 remained in the market by 2023. This means that the so-called survival rate during this period was 67%. Based on the chart below, it can be observed that most enterprises fail within the first year of operation.

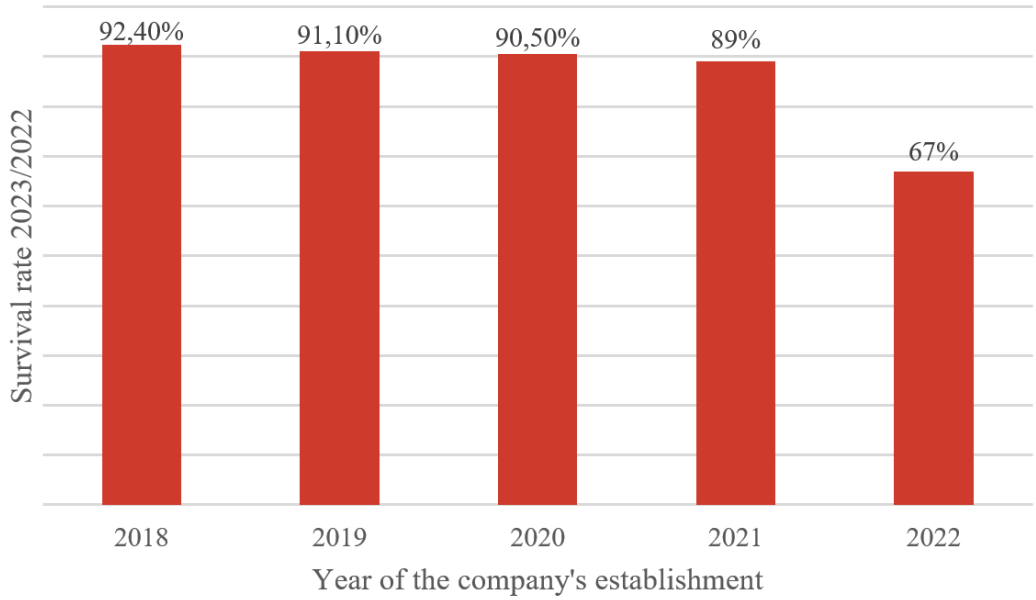


Fig 1. Enterprises established between 2018 and 2022 and still operating in 2023

Source: Own elaboration based on Orłowska, J., Łapiński, J. (2024).

The course of a crisis leading to a company's bankruptcy may, in some cases, last five to six years. Therefore, it is neither a sudden phenomenon nor entirely unpredictable. Enterprises with a strong organizational culture should be able to detect early warning signs at the onset of the crisis, and discriminant models can serve as one of the tools to support this process.

Overview of Discriminant Models

Widely used ratio analysis may prove to be an insufficient tool for assessing the economic and financial condition of an enterprise. Moreover, it is difficult to evaluate a company that shows high profitability but low liquidity or a high level of debt. Therefore, in enterprise management, it is essential to apply techniques that enable the early detection of bankruptcy risk. One such tool is discriminant analysis, which allows for the consistent use of data contained in financial statements. Discriminant models are applied to identify early symptoms of a deteriorating financial situation. The main purpose of these models is to generate information about potential threats to the effective management of a company's resources and the possible loss of financial liquidity.

According to many sources, the pioneer of research on discriminant models was E. Altman, who presented his first model in 1968. E. Altman's research initiated the development of many other models, and today numerous

versions exist that demonstrate a high level of accuracy in predicting corporate bankruptcy. Systemic transformation in Poland, which began in 1989 and continued throughout the early 1990s, stimulated interest in discriminant models.

The discriminant model in its classical form is a linear function. The discriminant variable is determined based on coefficients and independent variables, which, in the case of bankruptcy risk models, usually consist of various

$$Z = \alpha_0 + \alpha_1 * X_1 + \alpha_2 * X_2 + \cdots + \alpha_n * X_n$$

financial ratios. The following formula presents the general form of the discriminant model, where Z is the discriminant variable, α represents the coefficients of the discriminant function, X stands for independent variables, and n denotes the number of independent variables.

Fig 2. The discriminant model function

Depending on the number of variables used in the discriminant models, they can be classified as univariate or multivariate. Univariate models were mainly developed in the early stages of bankruptcy prediction research. These models assess a company's financial condition based on a single independent variable or several variables analyzed separately.

From an economic perspective, multivariate models are considered as the most important group, as they allow for the simultaneous analysis of multiple financial ratios. These models also take into account the predictive power of individual indicators to a greater extent. Multivariate discriminant analysis involves the use of a discriminant function to assign a analyzed entity to a predefined group.

The discriminant model is a tool characterized by its simplicity and the ease of interpreting the results obtained. Therefore, it can be readily used by a wide range of individuals and entities. This group, in particular, includes:

- business owners,
- company managers,
- current and potential contractors,
- financial institutions.

Another advantage of discriminant models is their high accuracy in predicting a company's bankruptcy within the following year, and sometimes within two years. However, it is important that these models are applied with consideration for the specific characteristics of the economy for which they were developed. A major advantage of discriminant models is their ability to compare heterogeneous enterprises.

Discriminant models also have several limitations. The most important drawback is that they become outdated when the economic situation of the country changes. Models developed many years ago may no longer be effective. Another limitation is that they are based on historical data from the balance sheet and the income statement. Therefore, they do not reflect the current condition of the company. It should also be noted that financial statements do not include certain factors that strongly influence a company's financial situation, such as qualitative factors, human factors, development opportunities, and the current economic climate.

Over the last few decades, many discriminant models adapted to the Polish economic environment have been developed. D. Hadasik, in her research on discriminant analysis, presented nine models used to assess bankruptcy risk. Her sample included mainly state-owned enterprises, limited liability companies, and joint-stock companies. Another researcher examining bankruptcy prediction was A. Hołda, who studied a homogeneous group of firms operating in the same sector. In 2006, E. Mączyńska, together with M. Zawadzki, published the results of their research. The authors developed seven discriminant models based on a sample of 80 companies listed on the Warsaw Stock Exchange. Another well-known model in the literature on corporate bankruptcy is the one developed by J. Gajdka and D. Stos, designed to assess the financial condition of companies listed on the Warsaw Stock Exchange. Researchers M. Hamrol, B. Czajka, and M. Piechocki developed the Poznański discriminant model.

Discriminant models became widely known in the 1960s when E. Altman presented the results of his research. In Poland, interest in these models grew during the period of economic transformation. The first model adapted to

Polish conditions was introduced in 1994 by E. Mączyńska. In the following years, many other models were developed to predict bankruptcy among companies operating in Poland.

Discriminant models for bankruptcy prediction reduce the assessment of a company's financial condition to a single indicator that is easy to interpret. They are useful to a wide range of stakeholders, and when properly applied, they can predict bankruptcy with high level of accuracy. However, despite their advantages, discriminant models also exhibit several drawbacks, including their susceptibility to become outdated and their omission of random or unforeseen factors.

The use of discriminant models in assessing the bankruptcy risk of a selected company

The study focused on the company PSB Mrówka sp. z o.o., which operates in the so-called "do-it-yourself" sector of the retail industry. This means that the company's primary business activity involves the sale of products related to construction, interior finishing and furnishing, and garden architecture. PSB Mrówka operates exclusively in the Polish market. Financial statements from 2019 to 2023 were used for the discriminant analysis. To assess the degree of bankruptcy risk, four models developed by foreign researchers and six models created by Polish authors were applied. These models are presented in Table 1. Subscripts were assigned to the discriminant functions to distinguish them in the subsequent analysis.

The independent variables of the discriminant functions may include financial ratios covering a wide range of financial data. In practice, this creates some limitations in data availability, as most companies are reluctant to share financial information unless required by law. Therefore, the selection of bankruptcy prediction models in this study was adjusted to the limited availability of financial data for the analyzed company.

A discriminant model is designed for a specific market and may poorly reflect the financial condition of companies operating in economies other than the one for which it was developed. Although the analyzed company operates solely in the Polish market, the study employed models created for foreign markets. This approach allows for a comparison of the sensitivity of the evaluated company's financial condition in foreign models with the sensitivity observed in Polish models. Additionally, two of the four foreign models were developed by E. Altman, who is considered a pioneer in the field of corporate bankruptcy research. His models are widely used and enjoy considerable popularity.

Table 1: Selected discriminant models for bankruptcy risk analysis and the structure of their functions

Model		Discriminant function formula
Foreign	E. Altman	$Z_{A1} = 0{,}717X_1 + 0{,}847X_2 + 3{,}107X_3 + 0{,}42X_4 + 0{,}998X_5$
	E. Altman	$Z_{A2} = 6{,}56X_1 + 3{,}26X_2 + 6{,}72X_3 + 1{,}05X_4$
	G. Springate	$Z_S = 1{,}03X_1 + 3{,}07X_2 + 0{,}66X_3 + 0{,}4X_4$
	O. Jacobs (adapted to the Polish conditions by E. Mączyńska)	$Z_M = 1{,}5X_1 + 0{,}08X_2 + 10X_3 + 5X_4 + 0{,}3X_5 + 0{,}1X_6$
Polish	INE PAN (E. Mączyńska and M. Zawadzki)	$Z_{INE\ PAN} = -1{,}498 + 9{,}498X_1 + 3{,}566X_2 + 2{,}903X_3 + 0{,}452X_4$
	D. Hadasik	$Z_{DH} = 2{,}59323 + 0{,}335969X_1 - 0{,}71245X_2 - 2{,}4716X_3 + 1{,}46434X_4 + 0{,}002460969X_5 - 0{,}0138937X_6 + 0{,}0243387X_7$
	J. Gajdka and D. Stos	$W_{GS} = 0{,}437449 + 0{,}017803X_1 + 0{,}588694X_2 + 0{,}138657X_3 + 4{,}31026X_4 + 0{,}01038X_5$
	„Poznański"	$Z_P = -2{,}368 + 3{,}562X_1 + 1{,}588X_2 + 4{,}288X_3 + 6{,}719X_4$

	D. Wierzba	$Z_W = 3{,}26X_1 + 2{,}16X_2 + 0{,}69X_3 + 0{,}3X_4$
	A. Hołda	$Z_{AH} = 0{,}605 + 0{,}681X_1 - 0{,}0196X_2 + 0{,}00969X_3 + 0{,}000672X_4 + 0{,}157X_5$

Source: Own elaboration based on data from Jagiełło, R. (2013) and Hamrol, M., Czajka, B., Piechocki, M. (2004).

The first two models presented in Table 1 were developed by E. Altman. These models are modifications of the original discriminant function created by the researcher in 1968, which applied only to publicly listed companies. This limitation arose because one of the independent variables included the value of share capital in the numerator. In 1983, the first of the models in Table 1 was modified by E. Altman to allow its use for non-public entities. The ZA2 model is a further modification introduced in 1990, which adjusted coefficients and removed the independent variable X5 to minimize the influence of industry-specific factors on prediction accuracy. The independent variables in these models are defined as follows:

X_1 = (current assets – short-term liabilities) / total assets

X_2 = retained earnings / total assets

X_3 = earnings before interest and taxes (EBIT) / total assets

X_4 = book value of equity / total liabilities

X_5 = net sales / total assets

The next model chosen to analyze the bankruptcy risk of PSB Mrówka is G. Springate's model, developed in 1978. It was one of the first significant models created outside the United States. The model's variables are calculated as follows:

X_1 = net working capital / total assets

X_2 = earnings before interest and taxes / total assets

X_3 = gross profit / short-term liabilities

X_4 = net sales / total assets

The following model is O. Jacobs' model, adapted to the economic conditions in Poland by E. Mączyńska. It was classified as a foreign model. Its independent variables are calculated as follows:

X_1 = gross profit + depreciation / liabilities and reserves for liabilities

X_2 = total assets / liabilities and reserves for liabilities

X_3 = gross profit / total assets

X_4 = gross profit / net sales

X_5 = inventories / net sales

X_6 = net sales / total assets

The first Polish model presented in Table 1 is the INE PAN model developed by E. Mączyńska and M. Zawadzki, known for its high accuracy in predicting corporate bankruptcy. Its variables are defined as:

X_1 = operating profit / total assets

X_2 = book value of equity / total assets

X_3 = (net profit + depreciation) / total liabilities

X_4 = current assets / short-term liabilities

Another model created for companies operating in Poland is D. Hadasik's model. The fifth version of this model, developed by the author, achieved an overall accuracy of over 96%. Its variables are:

X_1 = current assets / current liabilities

X_2 = (current assets – inventories) / current liabilities

X_3 = total liabilities / total assets

X_4 = (current assets – short-term liabilities) / total liabilities

X_5 = (short-term receivables × 365) / net sales

X_6 = (inventories × 365) / net sales

X_7 = net profit / inventories

The model developed by J. Gajdka and D. Stos is another selected model in the study. In their research, the authors reported a prediction accuracy of 85%. Its variables are calculated as:

X_1 = current assets / short-term liabilities

X_2 = liabilities and reserves for liabilities / total assets

X_3 = net sales / average total assets

X_4 = net profit / average total assets

X_5 = (net profit + interest) / net sales

The "Poznański" model was developed by three Polish researchers. Its function consists of a constant value of –2.368 and four independent variables, with 78% accuracy in bankruptcy prediction:

X_1 = net profit / total assets

X_2 = (current assets – inventories) / short-term liabilities

X_3 = fixed capital / total assets

X_4 = operating profit / net sales

Another model included in the study is D. Wierzba's. The author presented it in 2000. The research involved 48 companies, half of which had gone bankrupt and half were not at risk. Its prediction accuracy exceeded 92%, and its variables are calculated as follows:

X_1 = (operating profit – depreciation) / total assets

X_2 = (operating profit – depreciation) / net sales

X_3 = working capital / total assets

X_4 = current assets / total liabilities

The last selected model was developed by A. Hołda. It is known for its high predictive accuracy. Its variables are calculated as:

X_1 = current assets / short-term liabilities

X_2 = (liabilities and reserves for liabilities / total assets) × 100

X_3 = (net profit / average assets) × 100

X_4 = (average short-term liabilities × 360) / cost of goods sold

X_5 = net sales / average assets

The calculated values of the functions in the presented discriminant models allow the evaluated entity to be assigned to a specific group. The threshold values of the models were estimated based on the research conducted by the respective authors of the discriminant functions. Table 2 presents the value ranges used to assign an entity to a group. Research on corporate bankruptcy mainly aimed to determine whether a given entity is at risk of bankruptcy or whether its financial condition is sound. For this reason, the authors distinguished exactly these two groups. Additionally, two researchers identified a range of uncertainty in which it is impossible to determine the entity's situation. E. Altman, in his functions, distinguished a "gray zone," which indicates the lack of a clear classification of the entity. The range of this zone lies between 1.2 and 2.9 for the Z_{A1} function, and between 1.23 and 2.9 for the Z_{A2} function. A similar zone was defined in A. Hołda's model, where the financial condition of the entity could not be determined within the range from –0.3 to 0.1.

Table 2: Threshold values of the models used in the study

Model	Company at risk of bankruptcy	Company not at risk of bankruptcy
E. Altman	$Z_{A1} < 1,2$	$Z_{A1} > 2,9$
E. Altman	$Z_{A2} < 1,23$	$Z_{A2} > 2,9$
L.V. Springate	$Z_S < 0,826$	$Z_S > 0,862$
O. Jacobs (adapted to the Polish conditions by E. Mączyńska)	$Z_M \leq 0$	$Z_M > 0$
INE PAN (E. Mączyńska and M. Zawadzki)	$Z_{INE\ PAN} \leq 0$	$Z_{INE\ PAN} > 0$
D. Hadasik	$Z_{DH} \leq -0,42895$	$Z_{DH} > -0,42895$
J. Gajdka and D. Stos	$Z_{GS} < 0,432589$	$Z_{GS} > 0,432589$
„Poznański"	$Z_P < 0$	$Z_P > 0$
D. Wierzba	$Z_W < 0$	$Z_W \geq 0$
A. Hołda	$Z_{AH} < 0$	$Z_{AH} > 0$

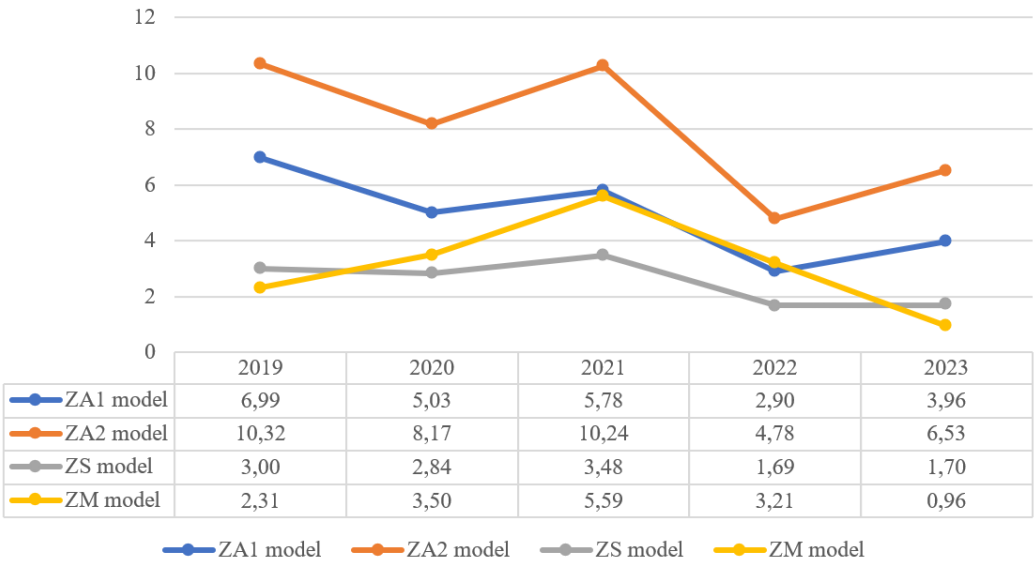
Source: Own elaboration based on Hamrol, M., Czajka, B., Piechocki, M. (2004) and Jagiełło R. (2013).

In summary, to assess the bankruptcy risk of PSB Mrówka, it was first necessary to calculate the independent variables of the discriminant models. The results were then adjusted according to the weights assigned to each variable. The sum of the variables, taking into account their coefficients, along with the constant, if present in the

model, determined the value of the discriminant function, which allowed the entity to be assigned to a specific group in each of the years under study.

Results of the conducted research

The research results on the discriminant models of PSB Mrówka for the years 2019–2023 were divided into two parts. The first part includes an analysis of the results of the discriminant functions of the models developed by authors of foreign origin. The second part presents an analysis of the results of the discriminant functions of the models developed to assess entities operating in the Polish market. The chart below illustrates the results for the discriminant functions of the Z_{A1}, Z_{A2}, Z_S and Z_M models for the years 2019–2023.



	2019	2020	2021	2022	2023
ZA1 model	6,99	5,03	5,78	2,90	3,96
ZA2 model	10,32	8,17	10,24	4,78	6,53
ZS model	3,00	2,84	3,48	1,69	1,70
ZM model	2,31	3,50	5,59	3,21	0,96

Fig 3. Values of the discriminant functions for foreign models

Based on the results presented in Figure 3, it can be concluded that none of the models indicated a risk of bankruptcy. E. Altman's Z_{A1} model entered the gray zone in 2022, where the classification of an entity into a particular group carries a risk of misinterpreting the result. Analyzing the changes in 2020, it can be observed that models developed for foreign markets indicated a decline in the financial condition of the company, whereas according to the modified model by E. Mączyńska, the company's financial situation improved significantly. In 2021, a significant increase in the Z_M function can again be observed, rising from a value of 3.50 to 5.59. The Z_{A2} function also saw a significant rise during this period. The version of the model designed to limit the impact of industry-specific factors increased to 10.24. The other discriminant functions in that year also indicated an improved financial situation compared to 2020.

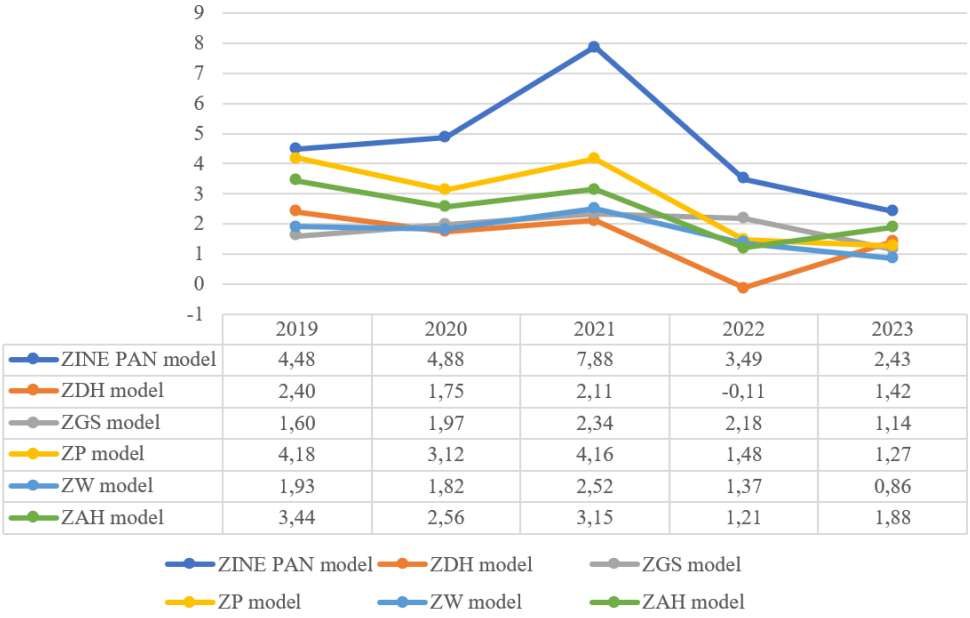
According to the results for 2022, there was a sharp decline in the values of all foreign discriminant models, indicating a significant deterioration in the company's financial condition. The values of the Z_{A1}, Z_{A2}, and Z_S functions decreased by half, while Z_M fell by almost 43%. In 2023, E. Altman's models showed a considerable improvement in financial condition. The value of G. Springate's model remained similar to that of 2022, while the results of the function adapted by E. Mączyńska suggested a further deterioration in the company's financial situation.

Based on the results of E. Altman's discriminant functions, it can be concluded that the bankruptcy risk of PSB Mrówka is relatively low. The Z_{A1} and Z_{A2} models reached their highest values in 2019, indicating that the company's financial condition was at its best during this period. The function values in 2020 and 2021 were also high. From an economic standpoint, the worst year for the company was 2022.

According to the Z_S function, in the years 2019–2021 the bankruptcy risk of the analyzed entity was low. The situation changed in 2022, when the model indicated a deterioration in financial condition. The model's threshold value was estimated at 0,862, with values further from zero indicating lower bankruptcy risk. Nevertheless, the model did not indicate any deterioration in 2023, confirming that PSB Mrówka's bankruptcy risk remains low.

Between 2019 and 2021, the discriminant function of O. Jacobs' model adapted by E. Mączyńska exhibited an upward trend, indicating no risk of bankruptcy during this period. In 2022, the trend reversed, and the function's value indicated that in 2023 the company experienced its poorest financial condition. The threshold value of the function was not exceeded. Therefore, it can be concluded that the company is not at risk of bankruptcy, although the bankruptcy risk has increased significantly.

Using the data presented in the Figure 4, an assessment of the financial condition and bankruptcy risk of the analyzed entity was conducted for the years 2019–2023. The presented data represent the results of discriminant functions obtained from the conducted analyses. The chart illustrates the values of the functions for $Z_{INE\ PAN}$, Z_{DH}, Z_{GS}, Z_P, Z_W and Z_{AH}. models. As mentioned earlier, these models were developed by authors of Polish origin.



	2019	2020	2021	2022	2023
ZINE PAN model	4,48	4,88	7,88	3,49	2,43
ZDH model	2,40	1,75	2,11	-0,11	1,42
ZGS model	1,60	1,97	2,34	2,18	1,14
ZP model	4,18	3,12	4,16	1,48	1,27
ZW model	1,93	1,82	2,52	1,37	0,86
ZAH model	3,44	2,56	3,15	1,21	1,88

Fig 4. Values of discriminant functions for models developed by authors of Polish origin

Based on Figure 4 and the threshold values for each function, it can be stated that, in the years 2019–2023, none of the models developed by Polish authors indicated a risk of bankruptcy for the analyzed entity. In 2019, the model developed by J. Gajdka and D. Stos was closest to the threshold value. An improvement in the company's financial condition in 2020 was observed only in the $Z_{INE\ PAN}$ and Z_{GS} models, whereas in 2021, the function values increased across all models. The Z_{GS} function in 2022 was slightly lower than in 2021, while the other models signaled a significant deterioration in the company's financial situation. The function values of four out of six models indicated that the company's worst financial condition occurred in 2023.

The Z_{GS} and $Z_{INE\ PAN}$ models showed an upward trend during the first three periods under analysis. According to the function values of both models, the company's financial condition deteriorated in 2022 and continued to worsen in the following year. Despite the downward trend in the last two periods, the function values allowed PSB Mrówka to be classified as not at risk of bankruptcy. The bankruptcy risk can be considered relatively low. However, if the declining trend in financial condition persists, the company's bankruptcy risk will increase.

It was not possible to determine a clear trend for D. Hadasik's and A. Hołda's models. The function values fluctuated continuously over the analyzed period. Based on Figure 4, the company's best financial condition according to these models occurred in 2019, and the worst in 2022. In 2023, the bankruptcy risk level remained low.

The function values of the Poznański discriminant model and the Z_W model fluctuated during 2019–2021. In 2022 and 2023, a decline in the function values was observed, indicating a deterioration in the company's financial condition. Nevertheless, the company can still be classified as not at risk of bankruptcy, although this risk increased significantly over the last two analyzed years.

The analysis using discriminant models showed that the bankruptcy risk of PSB Mrówka is low. A concerning aspect for the company's owners is that, over the analyzed period, the company's financial condition deteriorated significantly, which corresponds to an increase in the level of bankruptcy risk.

Five out of ten models indicated an improvement in the company's financial condition in 2023 compared to 2022. However, three of these models are foreign and have relatively limited applicability to the Polish market. The remaining five models, including O. Jacobs' model adapted by E. Mączyńska, indicate a deterioration in the company's financial situation in the last year.

Overall, the use of discriminant models allowed the company's financial condition to be classified as good, with a low risk of bankruptcy. Nevertheless, the negative trend of deteriorating financial condition over the analyzed period signals a growing bankruptcy risk. Four out of six models developed for the Polish market indicated a worsening of the company's situation in 2023 compared to 2022.

Summary

The study conducted using bankruptcy prediction models confirms the hypothesis of a deteriorating financial condition of PSB Mrówka. The values of the discriminant functions remained stable between 2019 and 2021, whereas in 2023, all models indicated lower values compared to those in 2019. This suggests that the bankruptcy risk of PSB Mrówka has increased. Nevertheless, the discriminant function values did not approach critical thresholds, so the risk of bankruptcy can still be considered low.

Despite the difficult economic conditions in Poland, PSB Mrówka maintained a low level of bankruptcy risk, although its financial situation deteriorated somewhat during the analyzed period. The analysis of the company's financial condition confirms the assumption that the increase in inflation and interest rates between 2019 and 2023 may lead to a decline in the profitability of entities in the DIY retail sector. An analysis of changes in the values of discriminant functions over time indicates that the most significant deterioration in financial condition and the increase in bankruptcy risk occurred in 2022 and 2023. Therefore, the hypothesis regarding the negative impact of the escalation of the conflict in Ukraine has been confirmed.

The results of this study indicate that discriminant models can provide a quick assessment of a company's bankruptcy risk and monitor changes in its financial condition over time. However, these models rely on historical financial data and therefore may not fully reflect the company's current financial situation. Furthermore, they do not account for non-financial factors that can also influence bankruptcy risk.

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