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USE OF CHOSEN DISCRIMINATION MODELS IN THE ASSESSMENT OF BANKRUPTCY RISK IN MEAT PROCESSING ENTERPRISES

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Abstract. The aim of the study is to assess the financial situation from the point of view of the bankruptcy risk of selected meat processing enterprises in Poland, such as: PKM Duda S.A., Indykpol S.A., Pamapol S.A. and Tarczyński S.A. For the analysis, 750 financial data were collected, by means of which five financial variables in the first model, four variables – in the second, the fourth and the fifth model and six variables in the second model, were generated. The main criteria for the selection of the companies for testing were: carrying out the main business in the area of meat processing (companies belonging to group 15.11 according to the PKD classification), legal status: limited liability company or joint stock company, which employs more than 50 people, and the availability of financial data. The analysis shows that all surveyed meat industry companies were in a very good financial situation. In 2008–2009 and 2012–2013 the most difficult financial situation and, consequently, the greatest threat of bankruptcy, was faced by Pamapol S.A. Extremely sensitive to the deteriorating situation of surveyed companies, and thus to the most common threat of bankruptcy, proved to be: D. Wierzby model (for all companies), in 2009 and Pamapol S.A. (in 2008) and D. Hadasik model (Pamapol S.A. in the years 2008–2009).

Key words: bankruptcy, discrimination analysis, prognosis of bankruptcy risk, assessment of enterprise's financial condition, meat processing, Poland

INTRODUCTION

Polish meat sector has both a high potential and position compared to other branches of the Polish economy. Actors on this market operate with a high exposure to risk, including economic and production risk. In Poland, the phenomenon of involuntary bankruptcy as a way to stop the economic activity did not occur until 1989 because the courts had not recorded the cases of bankruptcy (Cubała, 1996). Bankruptcy as an important part of economic life appeared after 1989, with the liberalization of the economic life.

BANKRUPTCY AND ITS DETERMINANTS

In a market economy a basic condition for the proper functioning and development of enterprises is to maintain financial liquidity, which is understood as the absence of a company's ability to purchase goods and services needed to meet its production needs, as well as the lack of ability to pay any financial obligations in full and within the applicable time limits (compare with: Bednarski, 1987; Duraj, 1989; Hill and Sartoris, 1995; Kulawik, 1992; Kusak, 2006; Michalski, 2005).

Loss of liquidity affects the deterioration of the overall company's financial situation which may lead up to its liquidation. One of the most drastic causes of the activity cessation is the company liquidation resulting

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from bankruptcy. A cessation is defined as the permanent cessation of business by the entrepreneur, leading to its physical liquidation and removal from the appropriate list of business units[1]. Thus, bankruptcy forces the business to stop operating. The immediate cause of bankruptcy is the permanent cessation of repayment of debts by the company (Hadasik, 1998).

The causes of bankruptcy are divided into endogenous and exogenous. The causes of endogenous nature (internal, inherent in the business) include issues which are qualitative in character, most commonly associated with errors in management, the wrong choice of management, lack of adequate financial or accounting information system, excessive pace of development, conducting business on a large scale, as well as the simultaneous operation of several capital intensive projects (Argenti, 1976). The endogenous reasons are the result of inefficient functioning of the enterprise which is considered to be the responsibility of traders. The second group of bankruptcy causes is attributed to external factors, which are beyond the company's influence, such as: instability of the governing rules required to conduct any economic activity in the country, as well as the state's fiscal policy. It should be noted that bankruptcy is not always a bad thing because it "cleans up" the market from inefficient entities and leads to a better allocation of company's resources. In most cases, the company's bankruptcy incurs additional costs for other units and can pose a real risk to other business entities.

A REVIEW OF EXISTING STUDIES

Many of the authors (compare with: Altman, 1983; Antonowicz, 2006, 2007, 2010; Gajdka and Stos, 1996; Grzegorzewska, 2008; Hamrol et al., 2004; Kitowski, 2012; Mączyńska, 2004, Wierzba, 2000) who research on bankruptcy confirm that bankruptcy does not appear suddenly, and some of the symptoms can be detected well in advance, giving a chance to take corrective action. One of the most important decisions made by the business board is to create a structure with respect to foreign equity. In the short term introduction of foreign companies funding is intended to allow financing of investments which would not be possible without additional funding. On the other hand, the long-term external sources of funding for increased earnings per unit of invested equity capital result in the so called financial leverage. If the company does not yield the expected profit, it is faced with difficulties handling financial obligations. Therefore, whether the company has developed the structure and terms of foreign capital equity or not, it significantly determines the potential danger of bankruptcy[2]. Detection of the first signs of financial difficulties of a company is possible by conducting comparative analyses of the good financial condition of the industry or corporate records of changes in their condition over time. Researchers are still looking for methods of financial risk detection well in advance in order to take certain preventive measures.

The review of literature on the use of discrimination methods to assess the risk of the bankruptcy of companies in the meat industry indicates that there is only one article about it (Wysocki and Kozera, 2012). Moreover, the existing models do not sufficiently provide bankrupt entities of the industry, thus justifying, to try to further analysis and design model for meat processing companies in the current economic environment.

Although discrimination models are frequently used, they are not universal methods. Sometimes, they are subject to simplification, misinterpretation, may also contain some factual errors resulting from the adoption of certain methodological assumptions without reference to their source (Kitowski, 2013a; Kitowski, 2013b). The use of discrimination methods depends on the type, size, industry-specific, location of businesses, as well as other conditions (Korol, 2010; Mączyńska and Zawadzki, 2006; Rogowski, 2008; Wardzińska, 2012).

The basis of most, used in the practice, forecasting models is the assumption that each currently functioning company falls into one of two disjoint research populations companies „in good financial condition" and those „in poor financial condition". The construction and forecasting of the bankruptcy models are based on information characterising the current economic and financial situation of the players and the results of its possible bankruptcy relate to the upcoming year.

The advantages of the use of discrimination methods include the chance to detect financial risks well in advance in order to take certain preventive measures.

[1] Ustawa z dnia 28 lutego 2003 r. (2003), Prawo upadłościowe i naprawcze, Dz.U. Nr 60, poz. 535.

[2] EMIS Emerging Markets Information Service. Retrieved January 10th 2014 from: www.securities.com.

Unfortunately, relying solely on financial data does not take into account the impact of variables such as: qualified executives, the company's market position. One of the major difficulties of the use of the indicatory analysis is to determine the reference point for the companies investigated, which has a decisive influence on the assessment and proposed solutions for their further action. In addition, the period of maintaining the credibility of the predictive model is conditioned by the existing economic situation, but no longer than ten years since its inception (compare with: Korol, 2010; Gołębiowski and Tłaczała, 2005).

MATERIALS AND METHODS

In Poland, according to the Coface Report[3] which covers the period from 1997–2008, there was a systematic increase in the number of declarations of bankruptcy from 794 to 1 863 in 1997–2002, with the exception of 2003 (1 798), and after 2003 there was a further increase from 1 798 to 4 011 in 2008. Since 2009, the number of bankrupt companies in the Polish economy remains relatively constant, although it is still high. In 2011, the courts declared bankruptcy of 723 Polish companies, while in 2012 there were 877 entities which went into liquidation, which is an increase of over 21% compared to 2011. By analysing bankruptcy from the point of view of legal forms in 2008–2013 the largest number of companies that went bankrupt were limited liability companies and sole traders.

It can be noticed from the data in Table 1 that in 2013 all the analysed companies employed a similar number of employees – 991 people (Pamapol S.A.), 1,016 people (Tarczyński S.A.), 1,168 people (Indykpol S.A.) up to 1,364 people (Duda S.A.). In 2013 the recorded total value of the sales revenue ranged from 457 892 thousand PLN (Pamapol S.A.), 462 128 thousand PLN (Tarczyński S.A.), 1.006 330 thousand PLN (Indykpol S.A.) to 1.903 592 thousand PLN (PKM Duda S.A.). The analysed companies are among the largest domestic producers and processors of red meat (Duda S.A., Pamapol S.A., Tarczyński S.A.) and white meat (Indykpol S.A.) and all are characterised by a high level of income derived from sales of products, goods and services in general, as well as the high number of employees.

The selection of units for the analysis was made conscientiously. The selection criteria had to be simultaneously fulfilled by all entities: a) the production of meat and meat products (PKD 15.11), b) conducting business in a joint stock company, c) employment of at least 50 people, d) complete availability of financial data in the analysed companies published in "Monitory Polskie B" in the period between 2005–2013.

Methods assess the financial condition of enterprises belong to the group of dynamic financial analysis, whose task is to give a full, multi-dimensional image, the *so-called* the operating status of the entity. According to the opinion formulated by the two authors (Mączyńska and Zawadzki, 2006) „there is no single, only the right and the best, model for the assessment of

[3] www.coface.pl, retrieved January 10th 2014 and www.egospodarka.pl, retrieved January 10th 2014.

Table 1. Characteristics of research units in 2013
Tabela 1. Charakterystyka obiektów badawczych w 2013 roku

Company name Nazwa przedsiębiorstwa	Legal form Forma prawna	Number of employees (persons) Liczba zatrudnionych (osoby)	Revenues from sales (thousand PLN) Przychód ze sprzedaży ogółem (tys. zł)
PKM Duda	limited company S.A.	1 364	1 903 592
Indykpol		1 168	1 006 330
Pamapol		991	457 892
Tarczyński		1 016	462 128

Source: own research based on data from Monitory Polskie B in 2013 and www.money.pl.
Źródło: opracowanie własne na podstawie danych z Monitorów Polskich „B" w 2013 roku oraz ze strony internetowej www.money.pl.

a firm in bankruptcy" and therefore deemed to be reasonable for adapting existing models of high efficiency in order to create a discrimination model tailored to the specific needs of meat processing enterprises in the future. The other reason for choosing these models is the ability to check multiple sets of variables because variables selection is made on the basis of „trial and error", experience in the construction of models and above all, access to complete and reliable financial data of homogeneous research groups within a given industry (compare with: Kitowski, 2012).

In this paper the following five selected Polish discrimination models of high efficiency were presented: the models developed by researchers at the Institute of Economics of the Polish Academy of Sciences, edited by E. Mączyńska called the INE 6 model as well as the INE 7 model, the Hadasik model, the Poznański model, the Czajka and Piechocki model, the Wierzby model. The choice of models for discrimination analysis was made on the basis of the criterion of maximum average overall efficiency, received by 36 Polish and 16 foreign corporate bankruptcy prediction models (Antonowicz, 2007a) in 2002–2006.

The first studied model is the INE 6 model, which was created as a result of the analysis of financial statements of 80 companies listed on the Warsaw Stock Exchange in 1997–2001. The critical value of the INE 6 model is zero, which means that those companies that reached value below zero were classified to the group with "poor financial condition", and those above – "good financial condition". The INE 6 model is characterised by efficiency of 94.20%[4], and it is described by the formula (Mączyńska, 2004):

$$Z\,6 = 9{,}478\ B\,1 + 3{,}613\ B\,2 + 3{,}246\ B\,3 + 0{,}455\ B\,4 + 0{,}802\ B\,5 - 2{,}478$$

where:

B 1 – operating profit / assets,
B 2 – equity / assets,
B 3 – (net profit + depreciation) / total liabilities,
B 4 – turnover assets / liabilities,
B 5 – sales revenues / assets.

The INE 7 model is described by the formula (Mączyńska, 2004):

$$Z\,7 = 9{,}498\ B\,1 + 3{,}566\ B\,2 + 2{,}903\ B\,3 + 0{,}452\ B\,4 - 1{,}4987$$

where:

B 1 – operating profit / assets,
B 2 – equity / assets,
B 3 – (net profit + depreciation) / total liabilities,
B 4 – turnover assets / current liabilities.

The critical value of the INE 7 model is zero, which means that the companies reached value below zero and were classified to the population with "poor financial condition", and those above – the population with "good financial condition". The INE 7 model is characterised by the highest efficiency equaling 94.82%.

The third model by D. Hadasik was built on the basis of the analysis of 61 companies belonging to the group of non-threatened by bankruptcy (39) and those which failed (22) and in the period from 1991 to 1997 submitted an application for bankruptcy in regional court in Poznan, Pila and Leszno. The boundary value is zero. The entities analysed with discrimination models are characterized by different ownership structure. Most of them were state enterprises, limited liability companies, joint stock companies and cooperatives. The D. Hadasik model is characterised by the efficiency of 95.08%, and in a study conducted by a team of M. Hamrol and J. Chodakowski of 57.6%. The Hadasik model is described by the formula (Hamrol and Chodakowski, 2008):

$$Z\,H = 2{,}362 + 0{,}365\ B\,1 - 0{,}765\ B\,2 - 2{,}404\ B\,3 + 1{,}590\ B\,4 + 0{,}002\ B\,5 - 0{,}012\ B\,6$$

where:

B 1 – current assets / current liabilities,
B 2 – (current assets – inventory) / current liabilities,
B 3 – total liabilities / total assets,
B 4 – (current assets – current liabilities) / total liabilities,
B 5 – receivables / sales revenues,
B 6 – inventory / sales revenues.

The fourth model called Poznański is described by the formula (Hamrol et al., 2004):

$$Z\,POZ = 3{,}562\ B\,1 + 1{,}588\ B\,2 + 4{,}288\ B\,3 + 6{,}719\ B\,4 - 2{,}368$$

where:

B 1 – net profit / total assets,
B 2 – (turnover assets – inventories) / current liabilities,
B 3 – permanent capital / total assets,
B 4 – profit from sales / revenue from sales.

[4] Antonowicz, 2007b.

The critical value of the Poznański model is zero. This model was based on the analysis of financial statements of 100 Polish commercial law companies in 1999–2002, where a half of the surveyed companies belonged to a group not threatened by bankruptcy, the so called "healthy companies". Selection of healthy entities was made according to the size of their assets. The Poznański model stood out with the efficiency of 96%.

The fifth model by D. Wierzba is described by the formula (Wierzba, 2000):

$$Z\,w = 3{,}26\,B\,1 + 2{,}16\,B\,2 + 0{,}3\,B\,3 + 0{,}69\,B\,4$$

where:

B 1 – (operating profit – depreciation) / total assets,

B 2 – (operating profit – depreciation) / revenue from sales of products,

B 3 – turnover assets / total liabilities,

B 4 – turnover assets / total assets.

The critical value in the D. Wierzby model is zero. The companies for which the value of the discrimination function is a negative number are considered to be at risk of bankruptcy, whereas companies with a positive number – are considered not to be at risk of bankruptcy. Financial data of 24 enterprises was used for the model. The group of companies at risk consisted of those which were declared bankrupt by the ruling of the Commercial Court in 1995–1998 andbegan composition proceedings. The model is characterised by the efficiency of 92%.

RESULTS AND DISCUSSION

The analysis carried out with the use of the INE PAN 6 model and INE PAN 7 model shows that in the period from 2005 to 2013 all four meat processing enterprises were in good financial situation (Table 2). In all analysed years Duda S.A., Indykpol S.A., Tarczyński S.A. reached the highest positive values exceeding the critical value of zero with the exception of two companies in the particular time period. In 2009 Duda S.A. reported a negative value for the INE 6 model (–1,92) and the INE 7 model (–2,62) and in 2013 Pamapol S.A. reported a negative value for the INE 6 model (–0,59) and INE 7 model (–0,72) as well as in 2008 only for the INE 7 model (–0,20).

In the INE 6 model Duda S.A. indicates values from 0,87 (2008) to 2,44 (2013) with the exception of 2009 (–1,92); the INE 7 model shows values of this function at the level of 0,43 (2012) to 2,39 (2006) with the exception of 2009 (–2,62), which means that in both cases the generated results indicated a good financial condition of the Duda company.

In the INE 6 model Indykpol S.A. indicates values from 1,43 (2013) to 5,93 (2007) and the INE 7 model shows values of this function at the level of 0,54 (2013) to 2,90 (2007), which means that in both cases the generated results indicated a good financial condition of the Indykpol company.

In the INE 6 model Pamapol S.A. indicates positive values of the discrimination function which oscillated at a high level of 0,33 (2012) to 6,22 (2006), with the exception of 2013 (–0,59). The INE 7 model reported positive values varying from 0,22 (2012) to 2,42 (2006), which means that Pamapol S.A. was not in danger of bankruptcy, with the exception of 2008 (–0,20) and 2013 (–0,72), which in both cases showed negative value.

In the INE 6 model Tarczyński S.A. indicates high positive values ranging from 0,82 (2013) to 4,07 (2005). The INE 7 model reported stable high values ranging from 0,60 (2013) to 3,13 (2005), which means that neither model qualified Tarczyński S.A. as a company threatened by bankruptcy.

For all analysed companies in the period 2005–2013 the Hadasik model shows positive values, except for Pamapol S.A. in 2008 (–2,12) and 2009 (–2,01). Indykpol S.A. received the highest positive values indicating good financial condition occurring from the level of 0,68 (2013) to 2,17 (2007); in Duda S.A. from the level of 0,08 (2009) to 1,63 (2005); in Pamapol S.A. from the level of 0,44 (2013) to 1,89 (2006), and in Tarczyński S.A. from the level of 0,48 (2012) to 1,26 (2005).

In the period 2005–2013 the Poznański model reported positive values in all four enterprises, which means that all studied units were healthy and "they were not at risk of bankruptcy". The highest positive values of the discrimination function were noted in the Indykpol S.A. company from the level of 1,56 (2006) to 4,48 (2010) and Duda S.A. from the level of 0,43 (2009) to 4,49 (2006), Tarczyński S.A. from the level of 1,10 (2012) to 2,54 (2005) and Pamapol S.A. from the level of 0,25 (2012) to 3,98 (2006), except for 2013 (–0,07).

The Wierzby model revealed for Indykpol S.A., Pamapol S.A. and Tarczyński S.A. as many positive as negative values. The largest number of positive values was noted in Duda S.A. ranging from 0,11 (2013) to 0,55 (2006) with the exception in 2009 (–1,41) and 2012

Table 2. Results of the discrimination models for the analysed meat processing enterprises in 2005–2013
Tabela 2. Wyniki zastosowanych funkcji dyskryminacyjnych dla analizowanych przedsiębiorstw przetwórstwa mięsnego w latach 2005–2013

Model	PZM Duda S.A.								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INE PAN (6)	2.06	2.36	1.17	0.87	–1.92	1.79	2.42	1.76	2.44
INE PAN (7)	2.02	2.39	1.52	0.76	–2.62	1.24	1.59	0.43	1.20
Hadasik	1.63	1.51	1.21	0.26	0.08	0.64	0.87	0.70	0.81
Poznański	3.65	4.49	2.70	0.67	0.43	2.11	2.47	1.79	2.01
Wierzby	0.39	0.55	0.31	0.19	–1.41	0.13	0.19	–0.18	0.11
Model	Indykpol S.A.								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INE PAN (6)	3.24	4.50	5.93	2.77	4.06	2.11	1.49	1.45	1.43
INE PAN (7)	2.40	2.15	2.90	0.66	1.61	1.45	0.86	0.67	0.54
Hadasik	1.43	1.72	2.17	1.17	1.19	1.17	0.86	1.09	0.68
Poznański	3.20	1.56	2.31	1.96	2.59	4.48	3.09	2.17	1.99
Wierzby	0.12	0.24	0.53	–0.13	0.20	–0.09	–0.05	–0.08	–0.11
Model	Pamapol S.A.								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INE PAN (6)	1.41	6.22	2.77	0.79	3.22	1.70	1.21	0.33	–0.59
INE PAN (7)	1.82	2.42	1.37	–0.20	1.31	1.88	1.40	0.22	–0.72
Hadasik	1.85	1.89	0.95	–2.12	–2.01	1.40	1.40	0.56	0.44
Poznański	1.14	3.98	2.11	2.52	2.61	2.37	2.13	0.25	–0.07
Wierzby	0.10	0.57	0.11	–1.26	–0.63	0.24	0.08	–0.04	–0.51
Model	Tarczyński S.A.								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INE PAN (6)	4.07	1.88	0.98	1.17	2.25	2.34	1.14	1.12	0.82
INE PAN (7)	3.13	1.52	0.90	0.97	1.78	2.07	0.91	0.67	0.60
Hadasik	1.26	0.53	0.80	0.83	0.93	1.09	0.89	0.48	0.69
Poznański	2.54	1.82	1.88	1.56	1.90	2.40	1.52	1.10	1.26
Wierzby	0.08	–0.24	–0.50	–0.45	–0.09	0.01	–0.15	–0.37	–0.34

Source: own research based on the financial data of the analyzed meat processing enterprises.
Źródło: opracowanie własne na podstawie sprawozdań finansowych badanych jednostek.

(–0,18). In Indykpol S.A. one could note positive function values from 0,12 (2005) to 0,53 (2007), in Pamapol S.A. from 0,08 (2011) to 0,57 (2006), in Tarczyński S.A. from 0,01 (2010) to 0,08 (2005). In 2008–2009 and 2012–2013 the Wierzby model pointed out that all investigated companies could have become bankrupt (see Table 2).

In the period 2005–2013 the results of all five models used to analyse Duda S.A. and Indykpol S.A. classified the companies as non-threatened by bankruptcy, except for the Wierzby model. The values of the Wierzby model were considerably below the reference limit for Duda S.A. in 2009 (–1,41) and in 2012 (–0,18), as well

as for Indykpol S.A. in 2008 (–0,13), 2010 (–0,09), 2011 (- 0,05), 2012 (–0,08) and 2013 (–0,11). The Pamapol S.A. was in a good financial condition, not threatened by bankruptcy, except for 2008–2009 and 2012–2013. In 2008, three out of the five models signalled the threat of bankruptcy for Pamapol S.A., which were: the INE PAN 7 model with a negative value of 0,20, the Hadasik model (–2,12), the Wierzby model (–1,26), in 2009 the Hadasik model (–2,01) and the Wierzby model (- 0,63). In 2012 the Wierzby model indicated bankruptcy risk (–0,04). Conversely, in 2013, four of the five models pointed to the threat of bankruptcy of the company, except the Hadasik model(0,44). For Tarczyński S.A., all five models showed no threat of bankruptcy, except the Wierzby model in: 2006 (–0,24), 2007 (–0,50), 2008 (–0,45), 2009 (–0,09) 2011 (–0,15), 2012 (–0,37) and in 2013 (–0,34).

Although the effectiveness of the used models is high, it is not always to the satisfaction of classified actors „acting" and „fallen". Thus, in further analyses will be important to introduce wider number of groups and limits. In this way, the results will indicate the required direction of action across the enterprise.

SUMMARY

Analysing the outcome values of early warning models for these four enterprises it can be said that the meat processing companies were in a very good financial situation and far from bankruptcy. The most difficult financial situation and, consequently, the greatest risk of bankruptcy, was faced by Pamapol S.A. in 2008–2009 and 2012–2013. The following models proved to be particularly sensitive to the deteriorating situation of the surveyed companies, and thus the most common risk of bankruptcy: the D. Wierzby model (for most companies), models INE PAN 6 and INE PAN 7 (for two companies), the D. Hadasik model (for one company).

The use of discrimination analysis models to assess the risk of bankruptcy of enterprises is a helpful and valuable tool for decision-making processes in the face of a real threat of insolvency of operators ex-ante. However, it is worth noting that the discriminatory models based on the historical financial information do not take into account the specific circumstances of the company, industry or market, which have an impact on the level of results reliability. Therefore, there is a need to formulate national discriminatory models for various industries and companies.

LITERATURE

Altman, E. (1983). Corporate financial distress. New York: John Wiley & Sons.

Antonowicz, P. (2006). Weryfikacja zdolności prognostycznych wybranych modeli prognozowania upadłości przedsiębiorstw. Pr. Mater. Wydz. Zarz. UG, 2, 93–100.

Antonowicz, P. (2007). Metody oceny i prognoza kondycji ekonomiczno-finansowej przedsiębiorstw. Gdańsk: Wyd. ODiDK.

Antonowicz, P. (2010). Teoria i praktyczne aspekty wykorzystania analizy dyskryminacyjnej w prognozowaniu niewypłacalności (upadłości) przedsiębiorstw. Zesz. Nauk. US. Ser. Ekon. Probl. Usług., 50, 467–476.

Argenti, J. (1976). Corporate collapse. The causes and symptoms. London: McGraw-Hill.

Bednarski, L. (1987). Analiza finansowa w przedsiębiorstwie przemysłowym. Warszawa: PWE.

Cubała, A. (1992). Upadek przed sądem. Firma, 13.

Duraj, J. (1989). Analiza ekonomiczna przedsiębiorstwa przemysłowego. Łódź: Wyd. Uniwersytetu Łódzkiego.

Gajdka, J., Stos D. (1996). Wykorzystanie analizy dyskryminacyjnej w ocenie kondycji finansowej przedsiębiorstw. In: Restrukturyzacja w procesie przekształceń i rozwoju przedsiębiorstw, R. Borowiecki (Ed.). Kraków: Wyd. Akademii Ekonomicznej w Krakowie.

Grzegorzewska, E. (2008). Ocena zagrożenia upadłością przedsiębiorstw w sektorze rolniczym. Zesz. Nauk. SGGW Warsz. Ser. Ekon. Org. Gospod. Żywn., 64.

Hadasik, D. (1998). Upadłość przedsiębiorstw w Polsce i metody jej prognozowania. Zesz. Nauk. AE w Poznaniu. Ser. II, 153.

Hamrol, M., Chodakowski, J. (2008). Prognozowanie zagrożenia finansowego przedsiębiorstwa. Wartość predykcyjna polskich modeli analizy dyskryminacyjnej. Bad. Oper. Decyz., 3.

Hamrol, M., Czajka, B., Piechocki, M. (2004). Upadłość przedsiębiorstwa – model analizy dyskryminacyjnej. Przegl. Org., 6.

Hill, N., Sartoris, W. (1995). Short term Financial Management: Text and Cases. Englewood Cliffs: Prentice Hall.

http://www.coface.pl. Retrieved January 10th 2014.

http://www.egospodarka.pl. Retrieved January 10th 2014.

http://www.money.pl. Retrieved January 10th 2014.

http://www.securities.com. Retrieved January 10th 2014.

Kitowski, J. (2012). Sposoby ujmowania kryterium specyfiki branżowej w metodach oceny kondycji finansowej przedsiębiorstwa. Zarz. Finans., 4.

Kitowski, J. (2013a). Sposoby ujmowania kryterium uwarunkowań działalności w metodach oceny kondycji

finansowej przedsiębiorstwa. Zesz. Nauk. Uniw. Szczec., 760. Finans. Rynki Finans. Ubezp., 59.
Kitowski, J. (2013b). Metody analizy dyskryminacyjnej jako instrument oceny ryzyka upadłości przedsiębiorstw. Zarz. Finans., 4, 3, 197–213.
Korol, T. (2010). Systemy ostrzegania przedsiębiorstw przed ryzykiem upadłości. Warszawa: Oficyna Wolters Kluwer.
Kulawik, J. (1992). Płynność finansowa. Pojęcia i metody pomiaru. Warszawa: IERiGŻ.
Kusak, A. (2006). Płynność finansowa. Analiza i sterowanie. Warszawa: Wyd. Wydziału Zarządzania UW.
Michalski, G. (2005). Płynność finansowa w małych i średnich przedsiębiorstwach. Warszawa: Wyd. Nauk. PWN.
Mączyńska, E. (2004). Globalizacja ryzyka a systemy wczesnego ostrzegania przed upadłością przedsiębiorstwa. In: D. Appenzeller (Ed.), Upadłość przedsiębiorstw w Polsce w latach 1990–2003. Teoria i praktyka. Poznań: Wyd. AE Pozn.
Monit. Pol. B (2005–2013).
Mączyńska, E., Zawadzki, M. (2006). Dyskryminacyjne modele predykcji upadłości przedsiębiorstw. Ekonomista., 2.
Rogowski, W. (2008). Dylematy wykorzystania w warunkach polskich modeli oceny zagrożenia upadłością. In: E. Mączyńska (Ed.), Bankructwa przedsiębiorstw. Wybrane aspekty instytucjonalne. Warszawa: Wyd. SGH.
Ustawa z dnia 28 lutego 2003 r. Prawo upadłościowe i naprawcze (2003). Dz.U. nr 60 poz. 535.
Wardzińska, K. (2012). Przykład zastosowania analizy dyskryminacyjnej do oceny sytuacji finansowej przedsiębiorstw. Econ. Manag., 3.
Wierzba, D. (2000). Wczesne wykrywanie przedsiębiorstw zagrożonych upadłością na podstawie analizy wskaźników finansowych – teoria i badania empiryczne. Zesz. Nauk. WSE-I Warsz., 9.
Wysocki, F., Kozera, A. (2012). Wykorzystanie analizy dyskryminacyjnej w ocenie upadłości przedsiębiorstw przemysłu mięsnego. J. Agribus. Rural Dev., 4.

ZASTOSOWANIE WYBRANYCH MODELI DYSKRYMINACYJNYCH W OCENIE RYZYKA UPADŁOŚCI PRZEDSIĘBIORSTW PRZETWÓRSTWA MIĘSNEGO

Streszczenie. Upadłość przedsiębiorstw stanowi poważne zagrożenie dla prawidłowego funkcjonowania gospodarki. Jedną ze skutecznych metod prognozowania upadłości przedsiębiorstw jest analiza dyskryminacyjna. Celem badań przedstawionych w artykule jest ocena sytuacji finansowej z punktu widzenia zagrożenia upadłością wybranych przedsiębiorstw przetwórstwa mięsnego, takich jak: PKM Duda S.A., Indykpol S.A., Pamapol S.A., Tarczyński S.A. przy zastosowaniu polskich modeli analizy dyskryminacyjnej. Do analizy zebrano 750 źródłowych danych finansowych czterech spółek, przy użyciu których wygenerowano pięć zmiennych finansowych w pierwszym modelu, cztery zmienne w modelu drugim, czwartym i piątym oraz sześć zmiennych w drugim modelu. Podstawowym kryterium doboru jednostek do badań była: produkcja mięsa i wyrobów z mięsa (przynależność przedsiębiorstw do grupy 15.11 według PKD) oraz forma prawna: spółka akcyjna zatrudniająca powyżej 50 osób, ciągłość danych finansowych w badanym okresie. Na podstawie przeprowadzonych badań wynika, że wszystkie analizowane przedsiębiorstwa były w bardzo dobrej sytuacji finansowej. W latach 2008–2009 i 2012–2013 najtrudniejszą sytuacją finansową, a w konsekwencji największym zagrożeniem upadłością była obciążona spółka Pamapol S.A. Niezwykle wrażliwym na pogarszającą się sytuację Pamapol S.A. był: model D. Wierzby i model D. Hadasik (w latach 2008–2009), a także model INE PAN 7 (w 2008 roku).

Słowa kluczowe: upadłość przedsiębiorstwa, analiza dyskryminacyjna, prognozowanie zagrożenia upadłością, ocena kondycji finansowej, przetwórstwo mięsne, Polska

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