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THE ASSESSMENT OF BANKRUPTCY RISK OF COMPANIES FROM THE SECTOR OF DRYING AND STORAGE OF CROPS AND PLANTS

OCENA RIZIKA BANKROTSTVA PRIVREDNIH DRUŠTAVA IZ DELATNOSTI SUŠENJA I SKLADIŠTENJA USEVA I ZASADA

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ABSTRACT

Contemporary market conditions make all business entities confront various risks – credit risk, liquidity risk, cash flow risk and market risk. Companies should predict these particular business risks and manage them adequately in order to minimize their influence. The assessment of creditworthiness and bankruptcy risk has a major role in the process of prediction and management of company risks. The creditworthiness of companies presents their ability to meet financial obligations to their creditors contemporary business conditions recognize several methods for assessment of credit ability of entities. One of the most commonly used models for credit ability valuation, as well as prediction of bankruptcy likelihood in a company is the Altman's Z-score model. The main scope of this article is the assessment of bankruptcy risk by using Altman's Z-score model for the group of companies from the agricultural branch of drying and storage of fruit.

Keywords: *risk, bankruptcy, credit ability, Z-score model*

REZIME

U savremenim tržišnim uslovima privredna društva se suočavaju sa različitim rizicima – kreditni rizik, rizik likvidnosti, rizik tokova gotovine i tržišni rizik. Privredna društva bi trebala da predvide ove rizike, na adekvatan način da upravljaju njima kako bi ih sveli na najmanji mogući nivo. Bonitet privrednih društava predstavlja pokazatelj sigurnosti izmirenja obaveza prema svojim poveriocima. U radu su analizirana privredna društva sa sedištem u Vojvodini, koja se bave preradom i konzervisanjem voća i povrća, kao i uslužnim delatnostima u gajenju useva i zasada, što je u stvarnosti delatnost skladištara u poljoprivrednoj proizvodnji. Obračun je izvršen na bazi javno objavljenih finansijskih izveštaja za 2018. i 2019. godinu. U 2018. godini, od 79 analiziranih privrednih društava čija je pretežna delatnost prerada i konzervisanja voća i povrća 63 % je ostvarilo pozitivan EBIT odnosno ostvarilo je poslovni dobitak, dok je 37 % ostvarilo negativan EBIT odnosno ostvarilo je poslovni gubitak u 2018. godini. Od 74 privrednih društava koja se bave uslužnim delatnostima skladištenja poljoprivrednih proizvoda, 53 % društava je ostvarilo pozitivan EBIT, dok je 47 % ostvarilo negativan EBIT u 2018. godini. Sa druge strane, u 2019. godini, od 79 analiziranih društava čija je pretežna delatnost prerada i konzervisanja voća i povrća 57 % je ostvarilo pozitivan EBIT odnosno ostvarilo je poslovni dobitak, dok je 43 % ostvarilo negativan EBIT odnosno ostvarilo je poslovni gubitak u 2019. godini. Od 74 privrednih društava koja se bave uslužnim delatnostima skladištenja, 59 % je ostvarilo pozitivan EBIT, dok je 41 % ostvarilo negativan EBIT u 2019. godini.

Ključne reči: *rizik, bankrotstvo, bonitet, Z-score model.*

INTRODUCTION

Agricultural production is very significant for the economic development of every country, due to the fact that it presents the basis of social stability, since food can be considered as a strategic product *(Milić et al., 2009)*. Due to its seasonal character, agricultural production is very specific. Having in mind that raw fruits and vegetables have a limited expiration date and with the aim to enable their preservation and use during the entire year, it is necessary to provide adequate conditions for their drying, processing and storage. Certain business companies are mostly specialized in activities in the area of drying and storage of crops and plants. This area of business has an increasing role because it enables the preservation of products until the more favourable sale time.

The share of agriculture in gross domestic product in the period between the year 2015 and the year 2018 was relatively stable, in the range from 6,00 % to 6,80 %. Therefore, agriculture was ranked fourt economic sector in the process of formation of gross domestic product. However, when taken into consideration that other economic acitivities (such as for example traffic and storage, processing industry) rely on agricultural economic acitivity, it definitely increases the significance of agriculture in the creation of gross domestic product. The activity of drying and storage of agricultural products presents a very important link to successful agriculture, from where the significance of analysis of all risks in this area arises.

Due to dynamic business environment as well as economic competitiveness, business entities confront various types of risks in their business activities, primarily credit risk, liquidity risk, cash flow risk and market risk (*Popov et al, 2019*). Business companies have the need not only to predict business risks, but also to recognize them and manage them adequatly in order to minimize their influence. Inadequate risk management can lead to deterioration of business position of companies and furthermore their bankruptcy or liquidation, which can reflect on a major number of participants in agricultural production. Owners of agricultural products that require storage still do not have the sufficient level of certainty and are not provided with

satifactory value. In practice, it is often seen that business companies that storage agricultural products have gone bankrupt and consequently made damage to numerous owners of agricultural products that storaged their products in that entity. Furthermore, this scenario undermines the position of a very important sector of storage, since its role is to preserve the products in the most viable and best possible way while waiting for the favourable sale moment to come.

For this specific reason it is necessary to preserve the creditworthiness of companies that presents „quantitative and qualitative form of capability and security of its business performance“ *(Rodić et al., 2015)*.

In a narrower sense, the creditworthiness presents the credit ability and liquidity of the company, and in a broader sense its overall position – organizational aspect, human resources, material and financial constitution, market position, business reputation, development programs, business perspective, and therefore the credit ability and liquidity *(Bogetić 1993.)*.

All mentioned above underlines the significance of assessing not only the creditworthiness of companies, but also the likelihood of bankruptcy.

Comparison of data from financial reports of certain entities with the branch data they belong to, it is possible to determine a relative position of the company in relation to the branch (*Malešević et al., 2011*).

Research subject in this paper presents the assessment of both creditworthiness and bankruptcy risk for the group of business entities from the agricultural branch of drying and storage of crops and plants, using the Altman's Z-score model. Analyzed business entities are active business companies headquartered in Vojvodina and its seven administrative districts (Južnobački, Zapadnobački, Severnobački, Severnobanatski, Srednjobanatski, Južnobanatski i Sremski district), which have made and delivered their financial reports for the year 2018. and 2019. to the Business Registers Agency, by the moment of beginning of this research. The analyzed group of enitities consists of 79 business companies registered for processing and conservation of fruits and vegetables, as well as 74 business companies that operate in the field of service activities in the process of production of crops and plants, within which are included business entities that perform storage activities. Calculation was made on the basis of publicly published financial reports for the year 2018. and 2019.

The aim of this research is, using the analysis of bankrutpcy risk indicators and assessment of creditworthiness of business companies that operate in the branch of drying and storage of agricultural products, to evaluate the sector that is a very imporatant link of agriculture, due to the fact that it is persistant in preservation of a significant part of assets of every company. Great number of agricultural producers that storage their agricultural products at warehouses are indirectly exposed to the same risks that warehouse owners are. Business companies that operate in the field of drying and processing of agricultural products are very significant for the stability of fruit production. The before mentioned outlines the importance of creditworthiness analysis and evaluation of bankruptcy risk of companies that perform drying and storage of agricultural products, as a significant agricultural sector.

Business companies that operate in the branch of processing and conservation of fruits and vegetables produce food with the main component of fruit or vegetable. Moreover, they conserve the fruit by freezing, drying etc. Business companies that provide services in the field of production of crops and plants, perform the storage of those crops.

MATERIAL AND METHODS

In this paper the following methods are applied: the assessment of bankruptcy risk using the Altman's Z-score model, as well as the method of assessment of creditworthiness.

Assessment of bankruptcy risk of companies that were analyzed in this paper was made by applying the Altman's Z-score model, which, with the certain probability, can predict the likelihood of liquidation of a company for the period of time from one to five years. By application of this model, it is possible to predict the bankruptcy of a company with the probability of 96 % for the period of one year, and declining with the pass of time, with the probability of 50 % for the five-year period.

Several researchers of this topic provided different Z-score models, but in this paper the following equation, used in research of group of authors Robinson, T. et al. (2015), was applied:

$$\textbf{Z-score} = 1{,}2X_1+1{,}4X_2+3{,}3X_3+0{,}6X_4+X_5$$

X_1 – working capital/total assets
Working capital = Short term assets – short term liabilities
X_2 – retained earnings/total assets
X_3 – earnings before interest and tax/total assets
X_4 – equity/total liabilities
X_5 – sales revenues/total assets

Based on calculated values of Z-score, companies may belong to the safe zone of business and have good credit performance ($Z \geq 2{,}99$), grey zone of business if their credit ability is minimal ($2{,}99 > Z > 1{,}81$), or the risk zone where the business is in the risk of bankrutpcy ($Z < 1{,}81$).

Creditworthiness assessment was made using the method that is based on the data from publicly published financial reports of business companies. The applied method summarizes all indicators from the way they influence the creditworthiness of companies. According to the creditworthiness rating, companies can be sorted in several creditworthiness classes, that show certain probability of bankruptcy: companies that have excellent, very good and good creditworthiness have the probability of bankruptcy in the range of 0,00 % - 1,50 %, companies that have average and below average creditworthiness in the range of 1,50 %-5,00 %, while the probability of bankruptcy for the companies with bad and very bad creditworthiness is shown in the range of 5,00 %-100,00 %.

Distribution in creditworthiness classes and subclasses, based on prior experience, was made according to 6 groups of indicators: payment history, business, funds structure, equity structure, liquidity indicators and performance indicators.

Payment history (influence on creditworthiness 25 %) – includes the data of dynamics and way of settlement of obligations of the company. Information about the period of time of the account blockade based on the enforced collection of funds.

Business (influence on creditworthiness 20 %) – indicator that shows the business stability and type of risk the company is exposed to. Type and level of risk the business is exposed depends on the business activity of the company, its legal form, active performance period on the market, as well as the height of equity, achieved turnover and number of employees.

Funds structure (influence on creditworthiness 10 %) – presents the indicator of compatibility of funds with the main business activity of the company, as well as the term structure of funds (long-term and short-term).

Equity structure (influence on creditworthiness 20 %) – shows the relation of own and borrowed funds, as well as the relation of long-term sources to long-term funds.

Liquidity indicators (influence on creditworthiness 15 %) – show the ability of the company to settle short-term liabilities. Besides the indicators of long-term liquidity and payment history, gives a clear picture of a capability of the company to settle given obligations.

Performance indicators (influence on creditworthiness 10 %) – show achieved financial results of the company, as well as made investments in given market conditions.

Source of data are publicly published financial reports for the year 2018. and 2019. at the Business Registers Agency of Republic of Serbia, for analyzed business entities.

RESULTS AND DISCUSSION

Bankruptcy risk assessment, as well as the creditworthiness evaluation is performed for total 79 business entities that operate in the branch of processing and conservation of fruits and vegetables, and other 74 entities that operate in the field of storage services.

In the process of bankruptcy assessment all analyzed business entities are grouped in three categories based on reference values of Z-score, as following:

1) Business companies that operate in the safe zone;
2) Business companies that operate in the grey zone;
3) Business companies that operate in the risk zone;

Chart (Fig. 1) shows the structure of funds of companies from the branch of processing and conservation of fruits and vegetables, according to their Z-score.

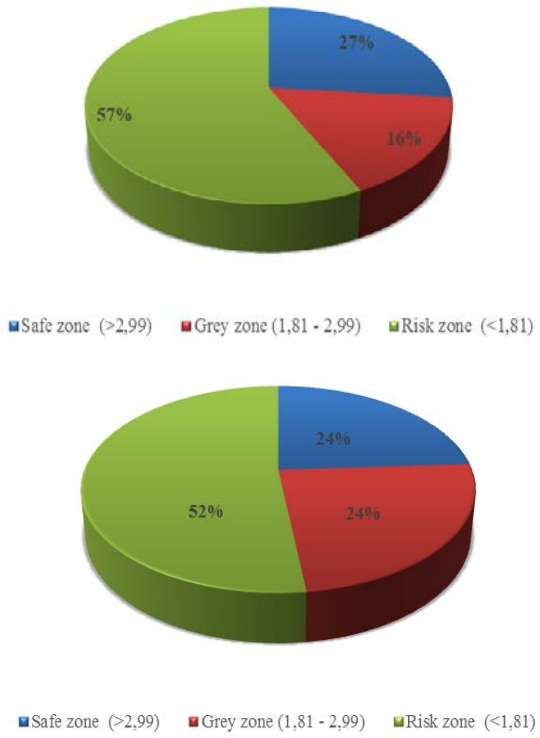

Fig. 1. Bankruptcy risk after application of Z-score on business companies from the branch of processing and conservation of fruits and vegetables for 2018 (up) and 2019 (down) (Source: Authors' calculations)

From the total of 79 analyzed companies from the branch of processing and conservation of fruits and vegetables, in 2018. 27 % of companies operate in the safe zone and are exposed to a very low bankruptcy risk, 16 % of companies operate in the grey zone and are marked as risky, while the rest of 57 % companies operate in the risk zone. In 2019. 24 % of companies operate in the safe zone and are exposed to a very low bankruptcy risk, 24 % of companies operate in the grey zone and are marked as risky, while the rest of 52 % companies operate in the risk zone.

Chart (Fig. 2) shows the structure of business companies from the field of service provided in the production of crops and plants, within which are all companies that provide storage services, according to their Z-score.

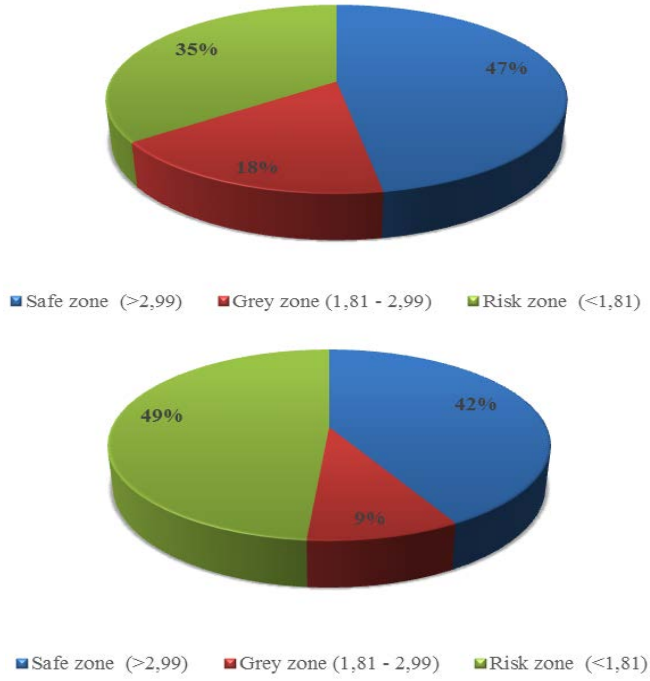

Fig.2. Bankruptcy risk after application of Z-score on business companies that provide storage services for 2018 (up) and 2019(down) (Source: Authors' calculations)

From the total of 74 analyzed business companies that provide services of storage of crops and plants, in 2018. 35 % of them operate in the safe zone and show a very low level of bankrutpcy risk, 18 % of companies perform their business in the grey zone and their business is marked as risky, while the remaining part of 47 % operates in the risk zone. In 2019. 42 % of analyzed business companies operate in the safe zone and show a very low level of bankrutpcy risk, 9 % of companies perform their business in the grey zone and their business is marked as risky, while the remaining part of 49 % operates in the risk zone.

Besides the bankruptcy risk assessment, in this paper was also performed a creditworthiness evaluation of all analyzed business companies.

The following chart presents the structure of business companies from the branch of processing and conservation of fruits and vegetables, according to their assessed creditworthiness.

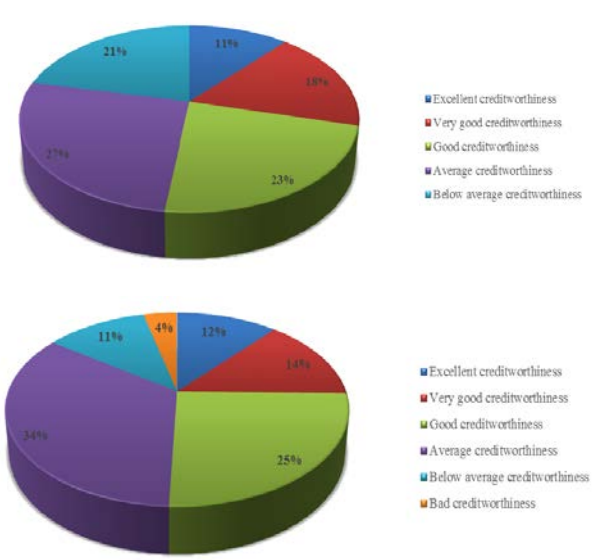

Fig. 3. Creditworthiness assessment for business companies in the branch of processing and conservation of fruits and vegetables for 2018 (up) and 2019(down) (Source: Authors' calculations)

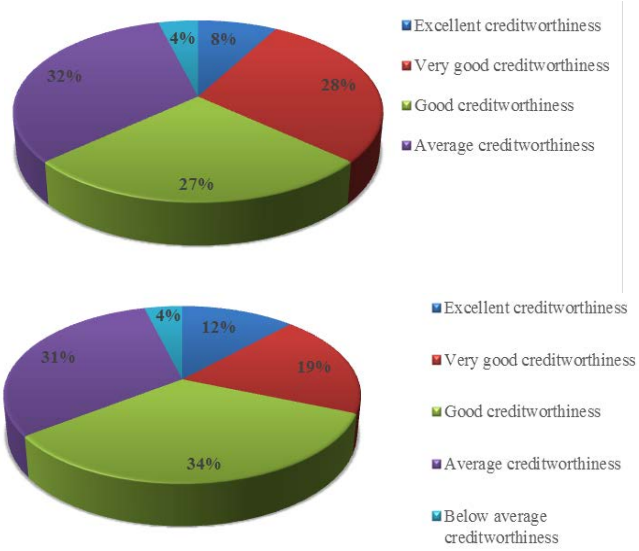

Fig. 4. Creditwortiness assessment of business companies that provide storage services for 2018 (up) and 2019(down) (Source: Authors' calculations)

From the total of 79 analyzed companies in the branch of processing and conservation of fruits and vegetables, in 2018. 11 % of companies showed excellent creditwortiness, 18 % of companies has a very good creditworthiness and 23 % showed good creditworthiness (Fig. 3). However, the largest number of companies or 27 % has average creditworthiness, while 22 % of all companies has below average results in terms of creditworthiness. In 2019. 12 % of companies showed excellent creditwortiness, 14 % of companies has a very good creditworthiness and 25 % showed good creditworthiness. The largest number of companies or 34 % has average creditworthiness, 11 % of all companies has below average results in terms of creditworthiness, while 4 % of companies has bad creditworthiness.

Chart (Fig. 4) presents the structure of business companies that operate in the branch of providing services of storage of crops and yields, according to their estimated creditworthiness.

From the total of 74 observed business companies that provide storage of yields and plants, in 2018. 8 % of these entities have excellent creditworthiness, 28 % of them have very good creditworthiness and 27 % of all show good creditworthiness. The greatest number of companies has average creditworthiness, while 4 % of them showed creditworthiness below average. In 2019. 12 % of business companies have excellent creditworthiness, 19 % of them have very good creditworthiness and 34 % of all show good creditworthiness. 31 % of companies has average creditworthiness, while 4 % of them showed creditworthiness below average.

This paper also adresses the structure of business companies from the branch of drying and storage of yields and crops, depending on whether they have achieved operating profit or operating loss, which is a preliminary indicator of a company's performance in the domain of these companies (it does not include financial and other extraordinary activities). From the total of 79 analyzed companies that operate in the branch of processing and conservation of fruits and vegetable, 63 % of companies achieved positive EBIT or operating profit, while 37 % of them achieved negative EBIT or operating loss in year 2018. In 2019. 57 % of companies achieved positive EBIT or operating profit, while 43 % of them achieved negative EBIT.

Furthermore, the authors performed the analysis of 74 business companies from the service branch in the production of yields and plants, from which 39 companies, presenting 53 % of all companies, achieved positive EBIT or operating profit, while 47 % of them achieved negative EBIT or operating loss in year 2018. In 2019. 59 % of companies achieved positive EBIT or operating profit, while 41 % of them achieved negative EBIT.

The significance of business analysis of companies from the mentioned agricultural branches is huge, especially from the aspect of companies from other branches and agricultural households, that are directly or indirectly connected to the companies from the branch of storage and drying of crops and plants. It is stated that in the APV are registered 121.579 agricultural households, from which 74.935 agricultural households (62 %) are specialized in arable crops and 6.177 agricultural households (5 %) are specialized in perennial plantings. Having in mind the before mentioned, perception of importance of the branch of drying and storage of yields and crops should not be limited only to the analyzed number of business companies, since a great number of other agricultural companies and households cooperate with them in terms of delivery of fruits and vegetables, as well as storage of arable crops (wheat, soy, corn, sunflower etc.).

Based on achieved results, it can be concluded that the applied methods of Z-score model and creditworthiness assessment give approximately same results, where it is noticeable and worrying the number of companies that operate in the grey and risk zone with an unsatisfactory creditworthiness.

CONCLUSION

Subject of this paper is the assessment of creditworthiness and bankruptcy risk of total of 79 business companies from the branch of processing and conservation of fruits and vegetables and the total of 74 companies that provide services in the field of crops and plants production, where also belong companies that provide storage services, all headquartered in Vojvodina. The calculation was made on the basis of data from publicly published financial reports for the year 2018. and 2019.

Assessment of bankruptcy risk of business companies analyzed in this paper was performed by application of Altman's Z-score model, which is able to predict the liquidaton of an entitiy for the time frame from one to five years, with the certain level of probability. Research results show that from the total of 79 observed business companies from the branch of processing and conservation of fruits and vegetables, in 2018. 27 % of companies operate in the safe zone and are exposed to a very low bankruptcy risk, 16 % of companies operate in the grey zone and are marked as risky, while the rest of 57 % companies operate in the risk zone. In 2019. 24 % of companies operate in the safe zone and are exposed to a very low bankruptcy risk, 24 % of companies operate in the grey zone and are marked as risky, while the rest of 52 % companies operate in the risk zone. On the other hand, from the total of 74 obeserved companies operating in the service area of crops and yields production, in 2018. 35 % of them operate in the safe zone and show a very low level of bankrutpcy risk, 18 % of companies perform their business in the grey zone and their business is marked as risky, while the remaining part of 47 % operates in the risk zone. In 2019. 42 % of analyzed business companies operate in the safe zone and show a very low level of bankrutpcy risk, 9 % of companies perform their business in the grey zone and their business is marked as risky, while the remaining part of 49 % operates in the risk zone.

Creditworthiness assessment is performed on the basis of data from publicly published financial reports of companies for the year of 2018 and 2019. Reserach results show that from the total of 79 observed companies from the branch of processing and conservation of fruits and vegetables, in 2018. 11 % of companies showed excellent creditwortiness, 18 % of companies have a very good creditworthiness and 23 % showed good creditworthiness. However, the largest number of companies or 27 % has average creditworthiness, while 22 % of all companies has below average results in terms of creditworthiness. In 2019. 12 % of companies showed excellent creditwortiness, 14 % of companies have very good creditworthiness and 25 % showed good creditworthiness. The largest number of companies or 34 % have average creditworthiness, 11 % of all companies have below average results in terms of creditworthiness, while 4% of companies has bad creditworthiness.

On the other side, from the total of 74 analyzed companies from the service sector in production of crops and yields, in 2018. 8 % of these entities have excellent creditworthiness, 28 % of them have very good creditworthiness and 27 % of all show good creditworthiness. The greatest number of companies has average creditworthiness, while 4 % of them showed creditworthiness below average. In 2019. 12 % of business companies have excellent creditworthiness, 19 % of them have very good creditworthiness and 34 % of all show good creditworthiness. 31 % of companies have average creditworthiness, while 4 % of them showed creditworthiness below average.

From before mentioned results for business companies from the branch of processing and conservation of fruits and vegetables, arises the fact that 29 % of companies achieved excellent and very good creditworthiness, while 71 % of them have good, average and below average level of creditworthiness. In terms of bankruptcy risk analysis, it is noticeable that 27 % of companies operate in the safe zone, while the remaining 73 % of companies belong to the grey and risk zone. The same comparison is made for the other group of analyzed companies from the branch of storage services, where the results show that 36 % of companies have excellent and very good creditworthiness, while 64 % of them have good, average and below average creditworhitness. Bankruptcy risk analysis showed the results that indicated that 35 % of observed companies operate in the safe zone, while the 65 % of them perform within the grey and risk zone. Comparative analysis was performed for year 2019, where 26 % of companies from the branch of processing and conservation of fruits and vegetables have excellent and very good creditworthiness, while 74 % have good, average and below average creditworthiness. In terms of bankruptcy risk analysis, it is noticeable that 24 % of companies are in the safe zone while 76 % of these companies are in the risk zone and gray zone. The comparison was also made for the second group of analyzed companies from the branch of storage services, and it shows that 31 % of companies have excellent and very good creditworthiness, while 69 % have good, average and below average creditworthiness. Bankruptcy risk analysis shows that 42 % are in the safe zone, while 58 % of these companies are in the risk zone and the gray zone.

Mentioned data lead to the conclusion that applied methods give approximately same results, where it is noticeable and worrying the number of companies that operate in the grey and risk zone with unsatisfactory levels of creditworthiness.

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