# DESIGNING AN ADVANCED PPE MODEL TO MEASURE PERFORMANCE AND EFFICIENCY OF SLOVAK SPA ENTERPRISES

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*Abstract: Each model for measuring performance and prediction is different as it uses different mathematical approaches and works with different indicators. In the era of rapidly changing economic environment, the standard methods for measuring financial performance and assessing financial health are less adequate. Most authors focus on enhancing the predictive ability of original models by responding appropriately to the existing changed economic environment as the identification, increasing and managing enterprise performance and efficiency represent a key tool of today's competitive struggle. The objective of the paper is to create and then apply in practice a new innovative 3D model (PPE model) evaluating the current financial position of Slovak spa companies (P – positon), their future development prognosis (P – prognosis) as well as their efficiency (E – efficiency). The aim of the paper is to identify and implement traditional key indicators, predictive models and efficiency indicators within each of the model dimensions while respecting sectoral characteristics and financial particularities of Slovak spa enterprises. Creating a PPE model will help to better identify the current financial position of the sampled enterprises and, in this way, it will be able to reveal the causes hindering the development of their financial performance to a more accurate extent.*

*Keywords: PPE Model, Financial Health, Bankruptcy Models, Enterprise Efficiency, Spa Health Sector.*

*JEL Classification: C0, C53, M31, M21.*

## Introduction

Nowadays, the analysis and management of enterprise performance and efficiency is getting more and more attention than in the past due to the constantly changing global business environment bringing new, modern approaches to solve the issue in question. Kita, Šimberová (2018) claim that business activities have a large influence on the economy, environment, and society. Therefore, choosing the right key performance metrics is very important to ensure the performance evaluation with the high information value and the ability to subsequently influence and manage performance of enterprises as well as economies. As reported by Gallo, Mihalčová (2016), the main factor to company success is monitoring the actual market situation, therefore, a competitive struggle is won only by enterprises that are adequately dedicated to measuring and evaluating performance as well as efficiency and use the right approaches and measuring tools. Neither the Slovak spa enterprises are no exception, as thanks to them Slovakia belongs to one of the major and the most interesting spa countries in Europe. Although Slovakia is not well known on the international tourism market yet, regional specificity and variability predetermine the Slovak area for the development of tourism, which has become increasingly popular in recent years (Štefko et al., 2018).

# 1 Statement of a problem

Performance and efficiency assessment helps managers guide their organization toward achieving excellence leadership and impressive results (Hajiagha et al. 2013). As reported by Stříteská, Zapletal, Jelínková (2016), there is a growing effort to continually develop new financial performance assessment tools that can access the financial situation as accurately as possible, identify future risks, forecast business performance with the intention of determining the starting position of the business. In this regard, Yadav, Sushil, Sagar (2013) add that effective performance management systems and models should be based on system dynamics, sustainability and simulated performance. Their goal is according to Almajali, Alamro, Al-Soub (2012) to gain useful information and background on the efficiency and effectiveness, while encouraging managers to make the best decisions in favour of the enterprise. However, managers solve problems how to measure the performance to prevent the improvement of one part of the business at the expense of another as increasing the implementation of enterprise performance systems is linked to many problems in need of answering.

## 1.1 The importance of assessing the financial health of enterprises

As reported by Robinson et al. (2015), Narkunienė, Ulbinaitė (2018), despite the significant glorification of modern concepts, financial analysis indicators are most often used in current practice to assess the company's financial health. Palepu, Healy (2013) state that financial analysis can be defined as a comprehensive and systematic analysis of historical and planned financial statements using the financial indicators systems in order to evaluate the current and expected financial situation and to support the quality of its strategic management. According to Kiseľáková, Šoltés (2017), the main objective of financial analysis is to assess not only the state of the company's finances, but rather to analyse the financial health of the company, that is, the ability of the company to obtain returns from the capital invested.

According to Knápková, Homolka, Pavelková (2014), the financial and economic analysis allows revealing whether the company is profitable enough, whether it has the appropriate capital structure, whether it effectively exploits its assets and a whole range of other significant financial facts. Kraftová, Kašparová (2017) add that its aim is not only analysing the accounting data, but also identify the internal and external conditions in which the company carries out its activities. Mihalčová, Gallo, Pružinský (2017) emphasize that measuring company performance by means of generally accepted financial indicators is a source to key information on company efficiency and its future prospects. Vavrek, Adamišin, Kotulič (2017) add that these indicators and methods are easy to implement. However, they are the most distorted and were created for the purposes of the private sector. As reported by Goel (2016), the analysis of the set of financial ratios (indicators of liquidity, activity, capital structure, profitability and market value) is crucial in understanding the company's financial statements, identifying future trends and measuring the overall financial health of an enterprise.

## 1.2 Bankruptcy and creditworthy prediction models

The knowledge of the financial position of an enterprise ought not to be associated only with its past; however, financial management ought to be predominantly oriented towards the estimation of the company's future development through ex-ante's predictive financial analysis forecasting future development based on the use of

creditworthy and bankruptcy models. Therefore, methods based on ex-ante financial-economic analysis are currently getting more and more into the forefront. Kubíčková, Jindřichovská (2015) claim that there are several types of classification available in the literature, however, the most commonly used one is the following:

- **Bankruptcy models** – Altman's Z-score, Taffler's Model, Springate Model, Fulmer's Model, Beerman's Model, Bilderbeek's Model, Index IN95, IN99, IN01, IN05, Virág-Hajdu model, Poznański's model.

- **Creditworthy models** – Quick test, Doucha's Balance Analysis, Creditworthiness index, Aspect Global Rating.

Creditworthy models are based on a company's financial health diagnostics following the score evaluation of the individual areas of economic development. Consequently, the company is assigned according to the gained points to a certain performance category, on the basis of which the financial development is estimated. Bankruptcy models tackle the questions of whether or not the enterprise is going bankrupt, or more precisely its bankruptcy possibility (Karas, Řezňáková, 2017). The models of one-dimensional analysis (classifying companies as being prosperous or not based upon only one criterion) and multidimensional analysis (taking into account several indicators) are applied in this area. The main difference between bankruptcy models and creditworthy ones is that the bankruptcy models are based on real empirical data, while creditworthy models are partly based on theoretical knowledge.

## 1.3 Enterprise efficiency and its measurement

According to Cyrek (2017), the efficiency is understood as the relationship between outputs and inputs and it is often analysed in terms of goals. Carstina et al. (2015) emphasise that efficiency is closely interdependent to effectiveness, meaning that an efficiency undertaking without being effective will not have a very long period of existence, and an effectiveness of enterprise without obtaining efficiency automatically lead to unfavourable economic results. Enterprise performance evaluation is also based on the analysis of the manner of fulfilment of indicators specific to the different activities performed within processes. In many research studies, the concepts of performance, efficiency and effectiveness are perceived in the same meaning. Wagner (2009) states that efficiency can be perceived as one of the enterprise performance dimensions (see Fig. 1).

*Fig. 1: Basic dimensions of performance*
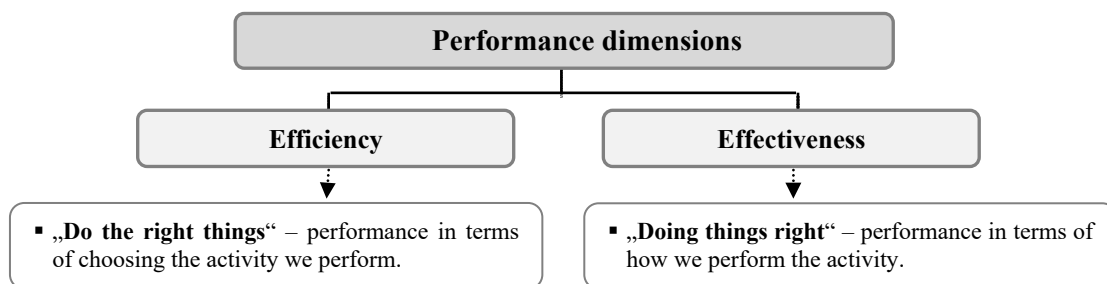


*Source: (Wagner, 2009)*

The efficiency is an important prerequisite for business performance as it represents one aggregate value comprised of multiple areas of financial and business performance assessment. Hedija, Fiala, Kuncová (2017) investigated this link between efficiency

and performance (measured by ROE, ROA and ROS). They found very weak or in many cases not statistically significant relationship between efficiency and profitability indicators. Based on the above-mentioned statements we can define performance measurement as a process of quantifying the efficiency and effectiveness of enterprise activities.

## 2 Methods

Spa tourism is one of the economy sectors with high growth potential and the main product line of tourism in Slovakia. For this reason, we focused on creating an innovative PPE model evaluating the current financial position of Slovak spa companies, their efficiency and forecasting their future development while respecting sectoral characteristics and financial particularities. We analysed links between the dimensions of the business performance and efficiency as we consider them to be some of the most important areas of business activity leading to the achievement of the strategic goals set. When modelling and analysing business processes and models, the main emphasis is usually put on model validity and accuracy, i.e., the model meets the formal specification and also models the relevant system (Ibl, Čapek, 2016). The new PPE model's structure is illustrated in the following Fig. 2.

*Fig. 2: The basic scheme of the new PPE model*
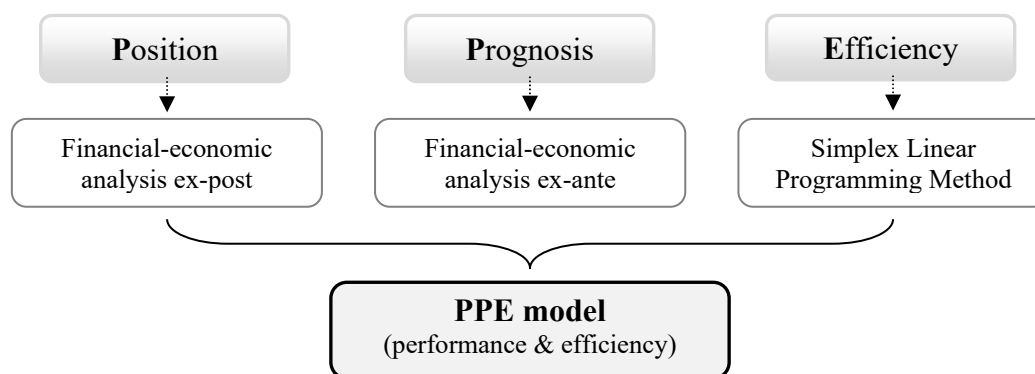


*Source: (own processing)*

### 2.1 Research sample and data

The research sample consisted of the 28 Slovak health spa enterprises with the official permission from the Ministry of Health of the Slovak Republic to operate the natural health spas and spa medical institutions in Slovakia. According to the statistical classification of economic activities (SK NACE Rev. 2), Slovak spa enterprises belong to section *Q – Health and social assistance*, *Division 89 – Health* and specific subcategory *86.909 – Other health care activities*. During the years 2013 – 2017, the total number of employees operating in the section *Q – Health and social assistance* was 6,305 on average and registered number of employees fluctuated on the average level of 81,792 (Statdat, 2019).The financial statements of the analysed spa enterprises' sample were drawn from a publicly available internet portal managed by the company DataSpot, Ltd. Data related to upper and lower quartile values within the subcategory SK NACE 86.909 were provided by CRIF - Slovak Credit Bureau, Ltd. All data obtained were processed in Microsoft Excel and statistical program STATISTICA, 5th edition. The identified outliers of financial indicators and prediction models have been removed due to the distortion of the final results and model created.

## 2.2 Quantification of individual dimensions of the PPE model

The assessment of the current **financial position** of the mentioned group of companies for the period of 2013-2017 was carried out on the basis of an ex-post financial-economic analysis. From each of the basic groups of ratio indicators (liquidity, activity, rentability and indicators of capital structure) we selected and quantified 10 ratio indicators (see Tab. 1) generally widespread and most commonly used in business practice. The calculation of the initial values of the financial indicators entering the financial health dimension was performed on the basis of Transformation Tab. 1. It was compiled according to the average upper and lower quartile values of the selected 10 indicators within the sector SK NACE 86 909. These values were used to determine the range of intervals (a total of 6) that were assigned points between 0 and 10. On the basis of the average value reached over the years 2013-2017, a particular spa company was rated by a maximum of 100 points. For a better understanding the calculation methodology and converting values of financial indicators to points, the transformation table is set out in Attachment 1.

So as to evaluate the **financial prediction** dimension, 10 selected ex-ante financial prediction models were used, focusing on the selection of creditworthy and bankruptcy models designed and applied under European conditions (see Tab. 2). The calculation of the original values of the predictive models entering the financial prediction dimension was performed on the basis of a Transformation table compiled in the same way as in the previous dimension. The only difference was that ranges of intervals were not based on quartile values, but on the generally recommended ratings and multilevel scales according to the individual prediction models. In the case of Bilderbeek's and Poznański's Model, the limit value between "safe" and "distress" zone of bankruptcy is 0. It would not be possible to set up a range of intervals, so we have determined the values of 5 and -5 as limit values. For a better understanding the calculation methodology and converting values of prediction models to points, the transformation table is set out in Attachment 2.

The calculation of the **efficiency** of spa companies was addressed using the Simplex Linear Programming Method (SLPM). According to Grell, Hyránek (2012), in the practical solution it is necessary to start from its simplification, while minimizing the deviations between the indicators of efficiency and effectiveness. The $u_i$ vectors (in relation to efficiency indicators) and $t_r$ vectors (in relation to effectiveness indicators) were obtained as a solution of:

- the basic equation:

$$\min \Sigma_j w_j = 0 \tag{1}$$

- under the conditions:

$$\Sigma_i u_i S^J_{M,ij} - \Sigma_r t_r c_{rj} - w_j = 0; \ \Sigma \ t_r = 1; \ u_i t_r w_j \geq 0 \tag{2}$$

- so finally, the order of transformation process efficiency was calculated by:

$$E_j = \Sigma_r t_r c_{rj} \ / \ \Sigma_i u_i S^J_{M,ij}, \tag{3}$$

where:

$w_j$ – deviations in individual years,
$u_i$ – value of weights for inputs,
$S^J_{M,ij}$ – inputs needed for linear programming,

$t_r$ – value of weights for outputs,
$c_{rj}$ – outputs needed for linear programming,
$E_j$ – efficiency.

The conversion of the original values of financial ratio indicators, bankruptcy models and achieved level of enterprise efficiency was realized on the basis of **modified scoring method** according to Rejnuš (2014). Each indicator from a given dimension can get a maximum of 10 points. If the maximum is not reached, points are assigned as follows: in the case of indicators whose development is going to be growing, we calculate the point rating by substituting the highest value of the indicator into the denominator; in the case of indicators whose development is going to be decreasing, we calculate the point rating by substituting the lowest value of the indicator into the numerator. A summary of points within the individual PPE dimensions was then plotted along the x-axis (the dimension of financial position), the y-axis (the dimension of financial prognosis) and the z-axis (the dimension of enterprise efficiency). Based on the cross point of the values achieved, we can determine the position of particular spa enterprise within the five performance fields:

- $< 0 – 20 >$ → unacceptable result,
- $< 20 – 40 >$ → unsatisfactory result,
- $< 40 – 60 >$ → acceptable result,
- $< 60 – 80 >$ → satisfactory result,
- $< 80 – 100 >$ → superior result.

## 3 Problem solving

### 3.1 Evaluation of financial position of enterprises (1st dimension)

The following partial analysis is aimed at evaluating and interpreting the development of selected financial ratio indicators of all spa enterprises forming the first dimension of the PPE model (see Tab. 1).

*Tab. 1: The development of average values of selected ratio indicators applied to spa companies in Slovakia over the years 2013 − 2017*

| Financial indicator (ex-post) | Unit | 2013 | 2014 | 2015 | 2016 | 2017 | Std. Dev. |
|---|---|---|---|---|---|---|---|
| Current Liquidity | coeff. | 0.99 | 0.94 | 1.06 | 1.02 | 0.98 | 0.0402 |
| Total Liquidity | coeff. | 1.04 | 0.99 | 1.10 | 1.08 | 1.13 | 0.0487 |
| Days Short-term Receivable | days | 37 | 47 | 84 | 77 | 43 | 19.096 |
| Days Short-term Payable | days | 103 | 108 | 148 | 147 | 118 | 19.156 |
| Total Indebtedness | % | 28.40 | 28.32 | 33.31 | 33.57 | 31.90 | 2.3084 |
| Interest Coverage Ratio | coeff. | 2.33 | 5.51 | 8.00 | 8.91 | 0.56 | 3.2054 |
| Total Credit Indebtedness | % | 42.96 | 18.15 | 12.50 | 11.22 | 27.05 | 11.708 |
| Return On Assets | % | 1.29 | 2.61 | 2.67 | 2.79 | 0.19 | 1.0183 |
| Return On Equity | % | 0.33 | 2.13 | 2.36 | 2.61 | -1.03 | 1.4069 |
| Return On Sales | % | 0.55 | 3.46 | 3.67 | 4.09 | -1.53 | 2.1836 |

*Source: (own processing)*

As for ratio indicators, we focused on Current liquidity, which belongs to the key performance indicators. In the course of the monitored period, the indicator indicating the illiquidity of the spa enterprises was below the value of 1, except for years of 2015 and 2016. Identical below-average values were also recorded for the Total Liquidity indicator. The analysis of Days Short-term Receivable Outstanding pointed out the poor payment discipline for business entities in the spa tourism. The spa enterprises

had been receiving a commercial loan throughout the period, so businesses lived to the detriment of their suppliers and acted relatively unethically. This matter is an issue of the bad business and credit policy. Based on the average Total Indebtedness of the spa enterprises at 31.10%, the level of Creditor Risk can be considered as optimal. The enterprises were financed mainly by means of their own capital, which demonstrates their financial independence. In 2013, they were unable to pay the price of foreign capital without problems. However, in the last year, the pre-tax profit was down by 93.45%, causing a significant negative downward trend in the indicator and directly reducing the business performance. Return on Assets, as one of the key performance indicators, averaged only at 1.91%, indicating the weak manufacturing power of the industry. A more profound analysis of Return on Equity and Return on Sales showed that during the years of 2013 and 2016 all indicators demonstrated a slow and insignificant, yet positively growing trend.

## 3.2 Evaluation of financial prediction of enterprises (2nd dimension)

The following partial analysis was aimed at evaluating the prediction model results of all spa enterprises forming the second dimension of the PPE model (see Tab. 2).

*Tab. 2: The development of average values of the selected prediction models applied to spa companies in Slovakia over the years 2013 − 2017*

| Prediction model (ex-ante) | Unit | 2013 | 2014 | 2015 | 2016 | 2017 | Std. Dev. |
|---|---|---|---|---|---|---|---|
| Quick Test | coeff. | 12.96 | 10.93 | 11.46 | 11.25 | 11.14 | 0.7032 |
| Doucha's Balance Analysis | coeff. | 2.85 | 1.07 | 0.82 | 1.19 | 4.24 | 1.3151 |
| Aspect Global Rating Model | coeff. | 9.04 | 4.60 | 4.76 | 4.04 | 3.27 | 2.0176 |
| Altman's Model (SR) | coeff. | 0.48 | 0.52 | 0.49 | 0.48 | 0.50 | 0.0150 |
| Taffler's Model | coeff. | -0.04 | 0.33 | 0.42 | 0.43 | 0.40 | 0.1775 |
| Creditworthiness Index | coeff. | 0.34 | 1.24 | 1.29 | 1.24 | 0.62 | 0.3911 |
| Beerman's Model | coeff. | -0.23 | -0.08 | -0.11 | -0.08 | -0.05 | 0.0629 |
| Index IN05 | coeff. | 4.54 | 0.66 | 2.71 | 1.45 | -1.51 | 2.0223 |
| Bilderbeek's Model | coeff. | -9.32 | -4.96 | -6.37 | -8.52 | -5.28 | 1.4706 |
| Poznański's Model | coeff. | 13.27 | 5.51 | 5.05 | 4.64 | 3.79 | 3.4280 |

The legend:
⬚ the financial situation and prospects are very good,
▨ grey zone, the financial situation is uncertain,
▰ the financial situation and the prospects are very bad.

*Source: (own processing)*

On the basis of the resulting values of the selected credit models, it is possible to state that the spa enterprises were in the grey zone as regards the tested results as part of the Quick Test scoring and their financial situation for the future is, therefore, uncertain. Excellent score evaluation, except in 2015, were achieved by spa companies when the Doucha's Balance Analysis was applied, based on which one can expect a favourable positive financial performance of businesses. The last (and at the same time the only) creditworthy model, according to which the prospects of spa companies are very poor, based on the results from 2017, is the Aspect Global Rating Model (spa enterprises were included into the CCC rating group). According to Bilderbeek's Model, Beerman's Model and Poznański's Model, the financial situation of the companies was assessed as very good, with a very low probability of bankruptcy, free of any problems regarding solvency and expected future. According to the results of

the Taffler's Model and Index IN 05, the group of the analysed enterprises was alternately assigned to successful and unsuccessful zones regarding their future development.

### 3.3 Evaluation of enterprises efficiency (3$^{rd}$ dimension)

To conclude, we evaluated the effectiveness of Slovak spa enterprises by means of SLPM. As input variables, we chose total costs, personnel costs and material costs. Output variables were represented by total revenues, net profit and value added. Based on the variables we considered to be the most determinant of the performance within the analysed sample of enterprises, we quantified the cost of returns, wage efficiency and material efficiency by applying the modified matrix system. The outputs were quantified in relation to the total revenues (index). In the following Tab. 3 are stated initial values of the selected inputs and outputs that represent the main basis for the efficiency quantification. Individual values (in €) represent the average values within the all health spa enterprises and indexes are quantified to overall revenues.

*Tab. 3: Input data needed for application of SLPM*

| Year | Inputs | | | Outputs | | |
|---|---|---|---|---|---|---|
| | Total costs (n₁) | Personnel costs (n₂) | Material costs (n₃) | Total revenues (v₁) | Net profit (v₂) | Added value (v₃) |
| | *Cost of returns* | *Wage efficiency* | *Material efficiency* | *In relation to total revenues* | *In relation to total revenues* | *In relation to total revenues* |
| **2013** | € 5,272,344 | € 1,793,050 | € 1,191,684 | € 5,446,131 | € 173,787 | € 3,050,390 |
| | *0.9681* | *0.3292* | *0.2188* | *1.0000* | *0.0319* | *0.5601* |
| **2014** | € 5,342,795 | € 1,861,158 | € 1,187,809 | € 5,535,894 | € 193,099 | € 3,249,967 |
| | *0.9651* | *0.3362* | *0.2146* | *1.0000* | *0.0349* | *0.5871* |
| **2015** | € 5,322,864 | € 1,899,399 | € 1,176,291 | € 5,538,486 | € 215,622 | € 3,224,747 |
| | *0.9611* | *03429* | *0.2124* | *1.0000* | *0.0389* | *0.5822* |
| **2016** | € 6,013,584 | € 2,060,184 | € 1,211,600 | € 5,927,758 | € −85,825 | € 3,408,810 |
| | *1.0145* | *0.3475* | *0.2044* | *1.0000* | *-0.0145* | *0.5751* |
| **2017** | € 5,979,006 | € 2,235,240 | € 1,217,483 | € 6,182,136 | € 203,130 | € 3,195,759 |
| | *0.9671* | *0.3616* | *0.1969* | *1.0000* | *0.0329* | *0.5169* |

*Source: (own processing)*

The Simplex Linear Programming Method analysis of efficiency consisted of weights ($u_i$, $t_r$) of selected indicators and deviations ($w_j$), the sum of which had to be minimized. Based on the results, we can state that the highest weight of the selected inputs was proved in the case of material efficiency indicator ($u_3 = 2.03604$) and wage efficiency indicator ($u_2 = 1.35644$). No significant weight was identified for the other selected input and output items. On the basis of calculated weights, we subsequently quantified the efficiency of the selected sample of enterprises. Maximum efficiency (1.000) was reached in 2015, vice-versa, the lowest in 2016 (0.7889). In the other years of the analysed period, the efficiency ranged from 0.8514 (2013) to 0.9912 (2017). The overall average efficiency of the Slovak health spa enterprises reached the level of 0.9254, so it can be considered relatively high.

### 3.4 Designing a final PPE model

On the basis of created methodology and results of the individual dimensions, we compiled the final PPE model evaluating the efficiency and effectiveness of Slovak spa companies over the years 2013 – 2017 (see Fig. 3).

***Fig. 3: The position of Slovak spa companies after the application of PPE model***
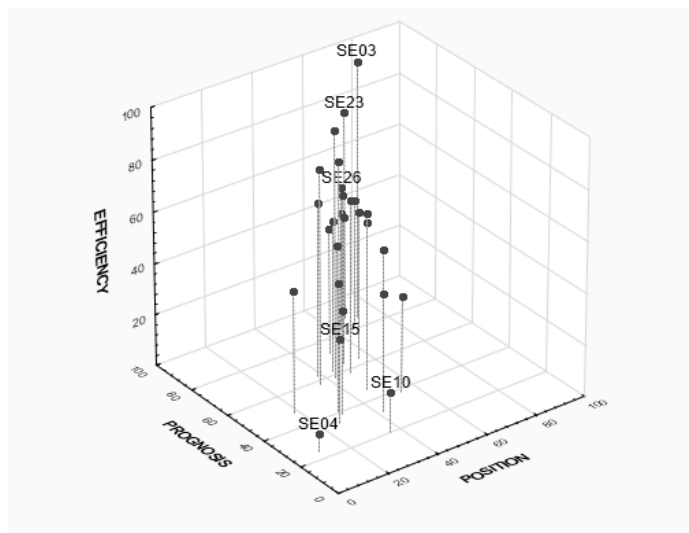
Based on the overall average score achieved after the transformation of values across all PPE dimensions, SE03 (Spa Bojnice, Inc.) obtained the first place. When carrying out a more detailed analysis of its position, we came to conclusion that the selected company achieved the highest overall values in the 1st dimension "Position" (72 points); for the 2nd dimension "Prognosis" achieved the 2nd place (86 points), while by obtaining 100 points in the area of efficiency, obtained the 1st place together with SE21 (Spa Pieniny Resort, Ltd.). The second highest overall score for the PPE was achieved by SE23 (Specialised spa Marina, s.p.), but it obtained leading score only in financial rating (68 points) and financial prediction (88 points). The resulting business efficiency reached 81 points, which was the main negative determinant worsening its overall score. The third most successful company was SE26 (Specialised spa SR Bystrá). However, the enterprise obtained significant score (84 points) only in the 2nd dimension of "Prognosis". Within the overall assessment of spa companies based on PPE model application as well as within its individual dimensions, it was SE04 (Spa Brusno, Inc.) that achieved the worst results. It was only in the dimension of financial prediction that it overcame another company, namely the SE10 (Spa Sliač, Inc.) by 4 points. Another cause of the unfavourable values of this business was its markedly low efficiency level achieved (16 points). It was SE15 (Spa Číž, Inc.) that ended up being the last but two, whose overall score was negatively affected by the results of the 1st dimension "Position" (26 points) and the third "Efficiency" (33 points).

In the end of our research, we categorized the average scores of individual spa companies into the performance and efficiency fields defined in the Methodology section. The results are graphically processed in Fig. 4. Based on the values, we may ascertain that only one of the enterprises achieved an unacceptable result (SE04 – having obtained the last place in the PPE model) and only one reached values highly above the average (SE03 – having obtained the first place in the PPE model). Nearly half of the analysed spa companies (46.43%) achieved on average acceptable results, which we consider quite positive. Most of the remaining research sample (28.57%) showed satisfactory results, with the remaining 17.86% pointing to problems with achieved levels of financial performance and efficiency.

*Fig. 4: Structure of performance and efficiency fields of Slovak spa companies*



Legend:
- Unacceptable result
- Unsatisfactory result
- Acceptable result
- Satisfactory result
- Superior result
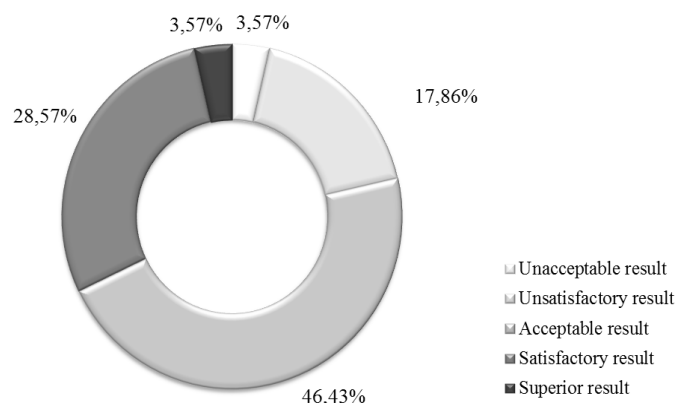
*Source: (own processing)*

## 4 Discussion

The authors Harumová, Janisová (2014), Šofranková, Kiseľáková, Horváthová (2017), Hyránek et al. (2018) have also focused on creating new models for evaluating the performance of Slovak enterprises using various methods and approaches. However, the motivation to create PPE model arose also from the fact that in the current Slovak conditions there is a lack of a 3D models analysing the performance and efficiency within the tourism sector. As we consider spa enterprises to be the main product line of tourism in Slovakia with a high growth potential, we have focused on creating an innovative PPE model that will help to analyse the current and future financial health of spa enterprises. Moreover, it will identify more accurately causes that hinder the development of financial performance and efficiency of the selected sample of enterprises.

## Conclusion

Sustainable development is now found as a central theme (Lešáková, Baťa, Provazníková, 2017). Therefore, performance and efficiency measurement is considered to be a topical issue. Choosing the right key metrics is very important to ensure the performance and efficiency evaluation and the adaptation of the models created to the sectoral characteristics and financial specifics of individual sectors of the economy is increasingly desirable. As reported by Pawliczek, Kozel, Vilamová (2018), strategic planning as well as continuous improvement are very important factors close to business performance. Based on the above-mentioned facts, we focused on creating a 3D model design (PPE model) in the conditions of the Slovak spa enterprises, which would be able to evaluate the level of three important dimensions of each business activity – financial position (P – position), prognosis of future development (P – prognosis) as well as efficiency (E – efficiency).

After having applied the created PPE model in Slovak spa companies, we have come to the following conclusions. Based on the overall average score achieved after the transformation of values across all PPE dimensions, spa companies SE03, SE23, SE26 with an average score of 78 points reached the first three places. On the other hand, the worst rated companies were SE04, SE10, SE15 whose score in the PPE model was only around 23 points. It can be, however, generally stated that almost half of Slovakia's spa companies (46.43%) achieved on average acceptable results of

32.14%, while 32.14% of the results were satisfactory and in one case, they were much higher than the average. Only one of the enterprises showed an unsatisfactory level in all the dimensions of the PPE model. The remaining 17.86% pointed to certain problems in the analysed area of financial performance and efficiency, the more detailed research of which will be the subject of our further scientific studies.

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***Attachment 1: Transformation Tab. 1 – financial ratio indicators***

| Ratio indicator | Range of intervals | | | Points | Ratio indicator | Range of intervals | | | Points |
|---|---|---|---|---|---|---|---|---|---|
| **Current Liquidity** | | > | **4.6980*** | *10* | **Interest Coverage Ratio** | | < | **0.0000**** | *10* |
| | 4.6979 | − | 3.6765 | *8* | | 0.0001 | − | 5.0050 | *8* |
| | 3.6764 | − | 2.6550 | *6* | | 5.0051 | − | 10.0100 | *6* |
| | 2.6549 | − | 1.6335 | *4* | | 10.0101 | − | 15.0150 | *4* |
| | 1.6334 | − | 0.6120 | *2* | | 15.0151 | − | 20.0200 | *2* |
| | | < | **0.6120**** | *0* | | | > | **20.0200*** | *0* |
| **Total Liquidity** | | > | **4.8800*** | *10* | **Total Credit Indebtedness** | | > | **41.0340*** | *10* |
| | 4.8799 | − | 3.8230 | *8* | | 41.0339 | − | 8.3615 | *8* |
| | 3.8229 | − | 2.7660 | *6* | | 8.3614 | − | -24.3110 | *6* |
| | 2.7659 | − | 1.7090 | *4* | | -24.3111 | − | -56.9835 | *4* |
| | 1.7089 | − | 0.6520 | *2* | | -56.9836 | − | -89.6560 | *2* |
| | | < | **0.6520**** | *0* | | | < | **-89.6560**** | *0* |
| **Days Short-term Receivable Outstanding** | | < | **31.9080**** | *10* | **Return On Assets** | | > | **20.0940*** | *10* |
| | 31.9081 | − | 46.4790 | *8* | | 20.0939 | − | 14.7135 | *8* |
| | 46.4791 | − | 61.0500 | *6* | | 14.7134 | − | 9.3330 | *6* |
| | 61.0501 | − | 75.6210 | *4* | | 9.3329 | − | 3.9525 | *4* |
| | 75.6211 | − | 90.1920 | *2* | | 3.9524 | − | -1.4280 | *2* |
| | | > | **90.1920*** | *0* | | | < | **-1.4280**** | *0* |
| **Days Short-term Payable Outstanding** | | < | **46.0960**** | *10* | **Return On Equity** | | > | **39.1820*** | *10* |
| | 46.0961 | − | 104.5730 | *8* | | 39.1819 | − | 26.5985 | *8* |
| | 104.5731 | − | 163.0500 | *6* | | 26.5984 | − | 14.0150 | *6* |
| | 163.0501 | − | 221.5270 | *4* | | 14.0149 | − | 1.4315 | *4* |
| | 221.5271 | − | 280.0040 | *2* | | 1.4314 | − | -11.1520 | *2* |
| | | > | **280.0040*** | *0* | | | < | **-11.1520**** | *0* |
| **Total Indebtedness** | | < | **19.2180**** | *10* | **Return On Sales** | | > | **16.6400*** | *10* |
| | 19.2190 | − | 36.0720 | *8* | | 16.6399 | − | 11.8030 | *8* |
| | 36.0721 | − | 52.9260 | *6* | | 11.8029 | − | 6.9660 | *6* |
| | 52.9261 | | 69.7800 | *4* | | 6.9659 | − | 2.1290 | *4* |
| | 69.7801 | − | 86.6340 | *2* | | 2.1289 | − | -2.7080 | *2* |
| | | > | **86.6340*** | *0* | | | < | **-2.7080**** | *0* |

*Note:*

\* *average upper quartile values over the years 2013 – 2017 within the sector SK NACE 86 909*

\*\* *average lower quartile values over the years 2013 – 2017 within the sector SK NACE 86 909*

*Source: (own processing)*

| Prediction model | Range of intervals | | | Points | Prediction model | Range of intervals | | | Points |
|---|---|---|---|---|---|---|---|---|---|
| **Quick Test** | | < | **4.0000**∗ | *10* | **Credit-worthiness Index** | | > | **3.0000**∗ | *10* |
| | 4.0001 | – | 8.0000 | *8* | | 2.9999 | – | 1.7500 | *8* |
| | 7.9999 | – | 12.0000 | *6* | | 1.7499 | – | 0.5000 | *6* |
| | 11.9999 | – | 16.0000 | *4* | | 0.4999 | – | -0.7500 | *4* |
| | 16.0001 | – | 20.0000 | *2* | | -0.7501 | – | -2.0000 | *2* |
| | | > | **20.0000**∗∗ | *0* | | | < | **-2.0000**∗∗ | *0* |
| **Doucha's Balance Analysis** | | > | **1.0000**∗ | *10* | **Beerman's Model** | | < | **0.2000**∗ | *10* |
| | 0.9999 | – | 0.8750 | *8* | | 0.2001 | – | 0.2375 | *8* |
| | 0.8749 | – | 0.7500 | *6* | | 0.2376 | – | 0.2750 | *6* |
| | 0.7499 | – | 0.6250 | *4* | | 0.2751 | – | 0.3125 | *4* |
| | 0.6249 | – | 0.5000 | *2* | | 0.3126 | – | 0.3500 | *2* |
| | | < | **0.5000**∗∗ | *0* | | | > | **0.3500**∗∗ | *0* |
| **Aspect Global Rating Model** | | > | **8.5000**∗ | *10* | **Index IN05** | | > | **1.6000**∗ | *10* |
| | 8.4999 | – | 6.7500 | *8* | | 1.5999 | – | 1.4250 | *8* |
| | 6.7499 | – | 5.000 | *6* | | 1.4249 | – | 1.2500 | *6* |
| | 4.9999 | – | 3.2500 | *4* | | 1.2499 | – | 1.0750 | *4* |
| | 3.2499 | – | 1.5000 | *2* | | 1.0749 | – | 0.9000 | *2* |
| | | < | **1.5000**∗∗ | *0* | | | < | **0.9000**∗∗ | *0* |
| **Altman's Model (SR)** | | > | **5.0000**∗ | *10* | **Bilderbeek's Model** | | < | **-5.000**∗ | *10* |
| | 4.9999 | – | 3.7500 | *8* | | -4.9999 | – | -2.5000 | *8* |
| | 3.7499 | – | 2.5000 | *6* | | -2.4999 | – | 0.0000 | *6* |
| | 2.4999 | – | 1.2500 | *4* | | 0.0001 | – | 2.5000 | *4* |
| | 1.2499 | – | 0.0000 | *2* | | 2.5001 | – | 5.0000 | *2* |
| | | < | **0.0000**∗∗ | *0* | | | > | **5.0000**∗∗ | *0* |
| **Taffler's Model** | | > | **0.3000**∗ | *10* | **Poznański's Model** | | > | **5.000**∗ | *10* |
| | 0.2999 | – | 0.2750 | *8* | | 4.9999 | – | 2.5000 | *8* |
| | 0.2749 | – | 0.2500 | *6* | | 2.4999 | – | 0.0000 | *6* |
| | 0.2499 | – | 0.2250 | *4* | | -0.0001 | – | -2.5000 | *4* |
| | 0.2249 | – | 0.2000 | *2* | | -2.5001 | – | -5.0000 | *2* |
| | | < | **0.2000**∗∗ | *0* | | | < | **-5.0000**∗∗ | *0* |

*Note:*
∗     *limit value to "safe zone" (negligible probability of filing bankruptcy)*
∗∗    *limit value to "distress zone" (high probability of reaching the stage of bankruptcy)*

*Source: (own processing)*