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Profitability index in the accommodation services sector in Slovakia

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Abstract: *Considering evolving market dynamics, high fixed costs and vulnerability to external shocks, such as the impact of the ongoing global pandemic, it has become increasingly important to assess profitability in the accommodation sector. This study proposes a composite profitability index for accommodation services in Slovakia, which integrates traditional financial indicators such as return on equity (ROE), return on assets (ROA) and return on sales (ROS), as well as broader indicators such as the value-added-to-sales ratio (VAS) and EBITDA margin. Each indicator captures a distinct aspect of financial health, from operational efficiency to capital utilisation and value creation. To ensure methodological robustness, the study employs three expert-based weighting techniques: the exact Saaty method, the approximate Saaty method and the best-worst method. A panel of 14 experts in economics, finance and hospitality management participated in a Delphi-based survey to evaluate the relative importance and optimal values of each indicator. All methods ranked ROA as the most critical metric, followed by ROS and ROE, meanwhile, EBITDA margin and VAS were considered less significant, yet still essential, for a comprehensive assessment. Using sectoral data and applying normalised scoring, the index captures profitability trends from 2020 to 2023. The aim of the study is to develop a composite profitability index for the accommodation services sector in Slovakia, based on the identified limitations of traditional indicators. The results show a marked post-pandemic recovery, with profitability index scores rising steadily across all weighting methods. Notably, the best-worst method yielded consistently higher index values, indicating its sensitivity to prioritisation extremes. This composite index provides accommodation businesses and policymakers with a practical tool for benchmarking, strategic planning and improving long-term financial sustainability in a volatile and competitive environment, offering a multidimensional framework for evaluating financial performance.*

Keywords: *Indicators, weights, exact Saaty method, approximate Saaty method, best-worst method.*

JEL Classification: *B41, C10, Z30, Z32.*

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Introduction

The accommodation sector plays a crucial role in each economy, particularly in countries with strong tourism potential such as Slovakia. It contributes not only to GDP generation, but also significantly supports regional development, employment and the overall attractiveness of the country. However, in recent years the sector has faced unprecedented challenges brought about by turbulent developments in external environment. The COVID-19 pandemic led to a sharp decline in tourism and

occupancy rates, resulting in severe financial distress for many entrepreneurs in the sector. Although recovery is underway, new issues continue to emerge, including changing customer behaviour, increasing operational costs, and labour shortages. In Slovakia, the industry has also been impacted by legislative changes, such as shifts in the VAT rate for selected tourism services and proposed changes in taxation and wage policy, including the debated introduction of a controversial transaction tax. Additionally, rising energy prices and inflation have put further pressure on the cost structures and profitability of accommodation businesses. These dynamics highlight the need to reassess the financial sustainability of enterprises operating in this sector characterized by their high fixed costs and variable demand. Under these conditions, a nuanced understanding of how profitability can be meaningfully assessed is essential for both practical decision-making and informed policy responses aimed at strengthening the resilience of the accommodation industry in the long term.

Profitability represents a key dimension in assessing a company's financial performance. In the hospitality sector, particularly within accommodation services, profitability analysis involves distinct challenges due to high fixed costs and demand volatility (Alrawabdeh, 2021). Unlike liquidity and indebtedness, which reflect financial stability and capital structure, profitability focuses on the performance and efficiency of business operations. It expresses the firm's ability to effectively utilize available capital, assets, or revenues to generate profit (Fadhillah et al., 2024). The importance of profitability metrics is highlighted by their capacity to guide strategic decision-making, attract investment, and facilitate performance benchmarking against competitors (Santos et al., 2022). Moreover, regular profitability analysis provides a more precise understanding of how qualitative outcomes evolve in response to the transformation of business processes, reflecting the efficiency of managing inputs and outputs (Lesáková et al., 2019). While profitability indicators offer valuable insights into the financial performance of enterprises, their interpretation must account for the broader external environment (Costa & Costa, 2024). The accommodation services sector is particularly exposed to such influences, as demonstrated by the COVID-19 pandemic, when travel restrictions and lockdowns led to substantial revenue losses (Blahušiaková, 2021; Vojteková & Klieštik, 2024). These circumstances highlight the sector's vulnerability to environmental disruptions, which markedly affect profitability even in otherwise well-performing firms (Šebová et al., 2024).

Traditional profitability indicators, such as return on assets (ROA), return on equity (ROE), and return on sales (ROS), provide only a partial view of a firm's financial health, with their interpretation often influenced by capital structure, accounting policies, and the tax environment (Altman, 1968; Beaver, 1966; Ohlson, 1980). Existing studies predominantly focus on individual indicators, resulting in a fragmented perspective on financial performance. Contemporary authors (Jović & Tomašević, 2021; Santos et al., 2022) therefore emphasize the need to extend performance assessment to include indicators capturing broader aspects of performance, such as the EBITDA margin or the share of value added in revenues. Despite these efforts, there remains a lack of an integrated tool that consolidates these indicators into a unified framework, enabling a multidimensional evaluation of profitability. The study addresses this gap by introducing a composite profitability index specifically designed for the accommodation services sector. The index integrates traditional financial indicators (ROE, ROA, ROS) with extended metrics, such as the share of value added in revenues and the EBITDA margin, thereby providing a more comprehensive assessment of firm financial performance.

To ensure methodological rigour, the study employs three expert-based weighting techniques: the exact Saaty method, the approximate Saaty method and the best-worst method. Drawing on median industry data over the period 2020–2023, the findings reveal a consistent post-pandemic recovery trend and demonstrate the usefulness of a multidimensional framework for assessing profitability. The proposed index has valuable implications for hospitality practitioners, policymakers and tourism stakeholders who are seeking to improve strategic planning, benchmarking and financial decision-making in an increasingly complex operating environment.

The aim of this study is to develop a composite profitability index for the accommodation services sector in Slovakia, based on

the identified limitations of traditional indicators. The proposed index integrates multiple financial metrics, enabling a more comprehensive assessment of financial performance. Based on this aim, the research question is formulated as follows: Which profitability indicators are considered most significant by experts, what weights should they carry in constructing a composite index, and how does the resulting index vary depending on the weighting method applied?

The paper is organized as follows. Chapter 1 – Role of profitability in business performance: Indicators and sector-specific considerations, gives information about all indicators examined. Chapter 2 – Methodology and expert-based weighting results provides methodology and information on determining weights using exact Saaty method, approximate Saaty method and so-called best-worst method. Chapter 3 – Results and discussion: Overall profitability index presents the results of our research and show the growth trend of the profitability index in accommodation sector in Slovakia. Finally, Conclusions suggest further avenues for investigating the profitability of not only accommodation services, but also new methods of determining weights in multi-criteria decision-making.

1 Role of profitability in business performance: Indicators and sector-specific considerations

The conceptual roots of modern profitability metrics reach back to the early 20th century. Brown's DuPont framework, developed around 1912, introduced return on investment (ROI) as a key measure of business performance – functionally equivalent to what is now commonly referred to as return on assets (ROA). By decomposing ROI into profitability and efficiency components, Brown provided the analytical foundation upon which later ratio-based performance frameworks were built (Flesher & Previts, 2013). Over subsequent decades, numerous scholars (i.e., Altman, 1968; Beaver, 1966; Ohlson, 1980) further advanced the empirical relevance of profitability indicators. Conventional approaches to profitability assessment emphasize the calculation of several key financial ratios, with return on equity (ROE), return on assets (ROA), and return on sales (ROS) being most frequently employed indicators. ROE assesses profitability relative to owners' equity, making it a critical metric for attracting and retaining investors. Conversely, ROA is a robust indicator of a company's efficiency in utilizing its assets to generate earnings (Aqil et al., 2019). ROA is influenced by the effective utilization of assets, with performance tied closely to occupancy rates and revenue per available room (Mundi et al., 2023). It can be calculated using various profit measures depending on the analytical objective and context. The most common formula uses net income in the numerator providing a comprehensive view of profitability after interest and taxes. Alternatively, EBIT (earnings before interest and taxes) is often used to assess operational efficiency, as it excludes the effects of financing and taxation. Some financial databases, such as cribis.sk (2025), apply EBT (earnings before taxes) to neutralize differences in tax regimes across companies. In performance analysis and value-based management, NOPAT (net operating profit after taxes) may be preferred for its focus on after-tax operational returns (Bouwens et al., 2019). Selecting the appropriate version of ROA depends on the purpose of the analysis – whether evaluating overall profitability, isolating operating performance, or enabling cross-company comparability. A higher ROA indicating efficient asset utilization in the hospitality sector, where asset-heavy investments are common, is crucial given the capital-intense nature of the industry (Mundi et al., 2023). ROS, also referred to as operating profit margin when based on operating income, captures the efficiency of a firm's core operational processes, while remaining unaffected by various secondary influences, many of which are external and beyond the firm's control. It measures the percentage of revenue that translates into operating profit (Lee, 2024). The hospitality industry relies on ROS to gauge both operational performance and cost-efficiency (Jugović & Maričić, 2024).

Despite certain conceptual limitations compared to more modern approaches, traditional profitability indicators continue to offer several important advantages. They satisfy several fundamental criteria for effective performance measurement, including accuracy, objectivity, and comprehensibility. Their values can typically be influenced by managerial actions and measured over relatively short time periods. Furthermore, they are grounded in internationally recognized accounting and financial reporting standards (Jović & Tomašević, 2021). Their auditability

enhances their credibility and ensures their continued relevance in both academic research and practical financial analysis. These ratios maintain a prominent role in firm's performance evaluation, largely owing to their interpretability, wide applicability, and the simplicity of their computation based on readily accessible financial statement data. This facilitates consistency and comparability across firms and industries, while also serving as a foundation for investment decision-making (Palepu et al., 2022). On the other hand, it is important to acknowledge the limitations of these indicators, particularly their high sensitivity to accounting and tax policies, as well as the firm's capital structure, Damodaran (2014). Contemporary research highlights the need to broaden the traditional understanding of profitability by incorporating indicators that capture wider aspects of value creation. Increasingly, additional measures such as the value-added to revenue ratio (VAS) and the EBITDA margin are being employed in profitability assessments. The VAS ratio is important mainly in assessing the productivity and impact of a business on its wider economic environment. It assesses the extent to which a firm internally generates value relative to its sales revenue. It expresses the proportion of sales that remains after deducting the cost of external inputs, thereby reflecting the firm's capacity to generate economic value through its operations. A higher VAS ratio indicates a firm's greater ability to retain value within the production process, through labour, capital, and innovation, rather than transferring it to suppliers. The VAS ratio complements traditional metrics by offering insight into the structural efficiency of the firm, particularly in terms of its value-generating potential (Tangen, 2005). Since value added reflects the income generated by a firm before it is distributed to capital and labour, it serves as a broader measure of operational performance that is less affected by differences in financial structure or tax regimes. In both cross-industry and longitudinal analyses, the VAS ratio can be employed to assess firms' underlying performance, particularly in industries where the cost of materials and intermediate goods represents a substantial share of total revenue. This ratio highlights the hospitality sector's reliance on service quality and guest experience as drivers of value creation.

The EBITDA margin provides a more comprehensive view of a firm's financial health (Setyopurnomo et al., 2025), capturing core operational performance without the distortion caused by tax strategies, depreciation methods, or variations in capital structure. EBITDA serves as a generalizable metric (a "one-size-fits-all" accounting figure) that summarizes a firm's profitability, cash-generating capacity, and its ability to service debt. It is calculated by adding back depreciation and amortization, which are non-cash expenses that do not affect the company's current cash flow (Bouwens et al., 2019). Additionally, some argue that excluding interest and taxes enhances the comparability of the metric across different firms (D'Souza et al., 2010). The EBITDA margin has emerged as a widely recognized proxy for assessing long-term operational efficiency, Maxim (2023). In recent years, it has attracted considerable attention both in academic literature and in practice, owing to its capacity to reflect core profitability unaffected by capital structure, tax regimes, or non-cash accounting items.

As such, it is frequently employed as a standardized benchmark for comparing profitability across firms and industries. A high EBITDA margin signals strong core profitability, critical for covering fixed costs and supporting ongoing investment in property and service improvements.

Subsequently, the formulas for computing the above-mentioned profitability ratios are introduced as follows:

$$ROE = \frac{\text{net income}}{\text{shareholder equity}} \times 100\% \quad (1)$$

$$ROA = \frac{\text{net income}}{\text{total assets}} \times 100\% \quad (2)$$

$$ROS = \frac{\text{operating profit}}{\text{net sales}} \times 100\% \quad (3)$$

$$\frac{\text{Share of value}}{\text{added in sales}} = \frac{\text{operating profit}}{\text{net sales}} \times 100\% \quad (4)$$

$$\frac{\text{EBITDA}}{\text{margin}} = \frac{\begin{matrix}\text{net income} + \text{taxes} + \\ + \text{interest expense} + \\ + D\&A\end{matrix}}{\text{net sales}} \times 100\% \quad (5)$$

where: *D&A* – depreciation and amortization.

Understanding profitability necessitates a comprehensive financial analytical approach that integrates multiple key performance indicators (Elexa, 2021). Profitability metrics provide crucial insights into operational efficiency, capital utilization, and overall financial health. Employing these indicators enables firms to diagnose performance drivers and areas of strength or weakness, thereby facilitating more informed strategic decision-making and promoting sustainable growth. However, relying solely on individual financial ratios can offer fragmented perspective that may not fully capture the multidimensional nature of firm's performance (Altman, 1968; Beaver, 1966). To address these limitations, the development of a composite index construed using expert-based methodologies offers a more integrated and robust assessment framework in multi-criteria decision making (Ishizaka & Labib, 2011; Saaty, 1977). By aggregating diverse financial metrics into a weighted index, tailored specifically for the hospitality accommodation sector, this approach contributes to a broader understanding of financial performance by combining key indicators into a unified index (Ohlson, 1980). Such composite indices are invaluable for benchmarking and comparative analysis, enabling stakeholders to identify best practices and emerging risks within the industry. This is particularly critical in hospitality, where market volatility, seasonality, and heterogeneous business models pose challenges for straightforward financial evaluation (Enz, 2009). Incorporating expert insights to determine the relative importance and optimal values of key profitability metrics enhances the index's relevance and practical utility of these metrics within the sector's specific context.

The profitability index is a comprehensive measure combining various profitability indicators to provide a more holistic view of a firm's financial health. In the hospitality sector, this index can help benchmarking performance against industry standards and identifying areas for improvement.

2 Methodology and expert-based weighting results

To construct a profitability index for the accommodation services sector, we first needed to obtain data on the perceived importance of selected profitability indicators and their values considered to be acceptable ("optimal") from the perspective of long-term business sustainability in this sector. To achieve this, we approached 20 experts. Their selection was based on their demonstrated expertise in economics, finance and financial analysis, accounting, business, and accommodation management, as well as on their practical experience in assessing financial performance or on relevant publications in the field. From the experts contacted, we ultimately formed a panel of 14 experts who expressed willingness to collaborate with us. The expert panel comprised 14 participants: six academics specializing in financial analysis and tourism, four managers of accommodation facilities with over ten years of professional experience, two hospitality consultants, and two professionals from industry associations. Data were collected in two rounds of a modified Delphi method between March and May 2025, using a structured electronic assessment form. Each round lasted approximately two weeks, with anonymized summaries of responses provided to participants between rounds for review. The form consisted of two main sections: (i) pairwise comparison of five indicators using the analytic hierarchy process (AHP) scale (1–9); and (ii) estimation of the optimal values for the indicators. Each section was accompanied by a methodological explanation and an illustrative example. The assessment form was based on the procedures described by Saaty (1977) and Rezaei (2016a) and was validated through pilot testing. The participating experts were asked to respond to two main questions, following a detailed explanation of the research objectives and the response procedure.

Determining the relative importance of profitability indicators

Respondents were asked to rank five selected profitability indicators based on their subjective assessment of the indicators' relevance for evaluating the sustainability and performance of accommodation service providers. The indicators were: I1 – return on equity (ROE); I2 – return on assets (ROA); I3 – return on sales (ROS); I4 – value added share (VAS) in revenues; I5 – EBITDA margin (EBITDA to revenues).

Respondents then entered their rankings into a pairwise comparison matrix based on the principles of the AHP method.

The respondents' task was to rank the individual indicators from most to least important based on their subjective opinion. They were

then asked to write the indicators in a square table or matrix, expressing the importance of a row indicator versus a column indicator using the numbers 1, 3, 5, 7 and 9 (Tabs. 1–3).

Determining the "optimal" values of profitability indicators

In the second part of the questionnaire, the experts were asked to estimate the "optimal" values for each profitability indicator as a percentage rate. Although we refer to these values as "optimal", it is acknowledged that, in the context of profitability indicators, universally optimal values cannot be strictly defined. Rather, the term "optimal" is used here to denote expert-informed target values that are considered appropriate for ensuring the long-term sustainability of businesses in this specific sector. These values reflected their opinions on what would constitute sustainable levels of profitability for businesses operating in the accommodation services sector.

After two rounds of questioning, we arrived at the final values to work with. We used a modal matrix to determine a matrix of importance values. The optimal values were determined as the median values of the indicators, as assessed by our experts. We then calculated the weights of each indicator, as shown in using three methods: the exact Saaty method, the approximate Saaty method, and the best-worst method, as shown in the following subsections. Each method has its advantages and disadvantages. From our point of view, the approximate Saaty method is probably the simplest, Damodaran (2015). However, given the availability of the Solver function in MS Office Excel, it is advisable to use the exact Saaty method, Saaty (2005). One of the most recent methods for determining weights is the best-worst method, introduced by Rezaei (2016b) and Brunelli and Rezaei (2019). The solver he constructed is available for free in Rezaei (2016b).

2.1 Saaty method

Weighting criteria is essential in decision-making when setting priorities. Several methods exist for this, notably Saaty exact method, which uses pairwise comparisons on a 9-point scale and computes weights via the eigenvector of the comparison matrix (Boďa & Úradníček, 2021; Brunelli & Rezaei, 2019).

The first step of the Saaty method is to construct a matrix that has as many rows and columns as there are indicators. We write the values from 1 to 9 in the table to express the relative importance of the row indicator compared to column one. To make the data consistent, it is obvious that we express the relative "unimportance" as the inverted value.

To verify the validity of the matrix, it is first necessary to calculate the so-called Saaty consistency index (*CI*) as follows:

$$CI = \frac{\lambda_{max} - n}{n - 1} \tag{6}$$

where: λ_{max} – the largest positive eigenvalue of the matrix; n – number of indicators.

The so-called consistency ratio *CR* is calculated according to the formula:

$$CR = \frac{CI}{RI} \tag{7}$$

where: *RI* – random index, which can be found in Beaver (1966) or Mu and Pereyra-Rojas (2017). For n = 5 random index *RI* = 1.11 (Altman, 1968).

For the matrix to be valid, in other words, for us to consider the matrix as sufficiently consistent, with respect to Beaver (1966) the value of *CR* must not exceed 0.10. Therefore, if the consistency ratio is at most 0.10, the matrix can be considered sufficiently consistent, otherwise it is necessary to re-evaluate the mutual comparisons of criteria, or indicators.

This statement implies that the consistency index expresses the degree of inconsistency of the matrix.

Remark 1

In practice, it is rarely possible to achieve full matrix consistency. But it should not be enforced unconditionally. In the case of inconsistent matrices, an eigenvector with positive components is searched for, the sum of which is 1, corresponding to the largest eigenvalue λ_{max} of the matrix. It is appropriate that $\lambda_{max} \approx n$, and the other eigenvalues are positive and close to 0. This follows from the consideration that small changes in the matrix elements lead to only small changes in the eigenvalues.

When determining the weights, we proceed from the condition that the elements of the matrix s_{ij} differ as little as possible from

the matrix v_i/v_j, and as a suitable measure we use the sum of the squares of the deviations of the elements of both matrices.

Therefore, the individual weights, which are listed in Tab. 1, can be calculated using the solver function in MS Office Excel, where the Saaty optimization criterion is minimized.

$$\min \xi = \xi^* \tag{8}$$

Under the conditions:

$$\min \sum_{i=1}^{n}\sum_{j=1}^{n}\left(s_{ij} - \frac{v_i}{v_j}\right)^2 < \xi \tag{9}$$

$$\text{and} \quad v_1, v_2, \ldots, v_n > 0 \wedge \sum_{i=1}^{n} v_i = 1 \tag{10}$$

where: s_{ij} – the individual elements of the matrix; $i, j = 1, 2, \ldots, n$; v_i – the weight of the i^{th} indicator; v_j – the weight of the j^{th} indicator.

Tab. 1: Saaty exact method

i, j	I2	I3	I1	I4	I5	v_i
I2	1	3	5	7	9	0.4409
I3	0.3333	1	3	5	7	0.3108
I1	0.2000	0.3333	1	3	5	0.1403
I4	0.1429	0.2000	0.3333	1	3	0.0633
I5	0.1111	0.1429	0.2000	0.3333	1	0.0446
v_j	0.4409	0.3108	0.1403	0.0633	0.0446	$\sum_{i=1}^{n} v_i = 1$

Note: I1 – return on equity (ROE); I2 – return on assets (ROA); I3 – return on sales (ROS); I4 – value added share (VAS) in revenues; I5 – earnings before interest, taxes, depreciation, and amortization margin (EBITDA to revenues).

Source: own

2.2 Approximate Saaty method

The approximate Saaty method is a great help for those who do not have a solver in MS Office Excel (Boďa & Úradníček, 2021). By simply calculating the geometric mean of the values assigned to each indicator, we can determine the weights of each indicator.

Tab. 2: Approximate Saaty method

i, j	I2	I3	I1	I4	I5	p_i	v_i
I2	1	3	5	7	9	3.9363	0.5100
I3	0.3333	1	3	5	7	2.0362	0.2638
I1	0.2000	0.3333	1	3	5	1.0000	0.1296
I4	0.1429	0.2000	0.3333	1	3	0.4911	0.0637
I5	0.1111	0.1429	0.2000	0.3333	1	0.2541	0.0329
Sum						$\sum_{i=1}^{n} p_i = 7.7176$	$\sum_{i=1}^{n} v_i = 1$

Source: own

The individual values of p_i are determined using the following formula:

$$p_i = \sqrt[n]{\prod_{j=1}^{n} s_{ij}} \tag{11}$$

We use the formula to calculate the normalized weights from the individual p_i values as follows:

$$v_i = \frac{p_i}{\sum_{i=1}^{n} p_i} \tag{12}$$

2.3 Best-worst method

The best-worst method (BWM) was introduced by Rezaei (2015, 2016a) and involves selecting the best and worst criteria and comparing them with others, making it effective for large sets of criteria. The best-worst method is based on a sequential comparison of pairs of indicators. In addition, it is shown that over the course of several years this method has become very popular in multi-criteria decision-making due to its properties.

The method is implemented in several steps.

Step 1. A set of decision indicators is determined.

Step 2. The best and worst criterion, or indicator, is determined. If more than one criterion, or indicator, is considered the best or worst, one can be arbitrarily chosen, Rezaei (2016a). In our case, among the five indicators, the most significant one is identified – best and the least significant – worst.

Step 3. The preference for the best indicator will be gradually expressed in comparison with the other indicators using the cardinal scale, which was also used in previous methods. The value 1 again represents a match in importance. Thus, we get $A_B = (s_{B1}, ..., s_{Bn})$ as the vector of the best indicator relative to the others. In our case, among the five indicators, the most significant one is identified – best and the least significant – worst. The best in our case is indicator I2 and the worst one is I5.

Step 4. The preference for the best indicator will gradually emerge in comparison with the other indicators using the cardinal scale, which was also used in previous methods. The value 1 again represents a match in importance. Thus, we get $A_B = (s_{B1}, ..., s_{Bn})$ as the vector of the best indicator relative to the others. In our case, it is the vector $A_B = (1, 3, 5, 7, 9)$, see Tab. 3. The preference of other indicators to the worst indicator is gradually expressed by the vector $A_W = (s_{1W}, ..., s_{nW})^T$. This vector in the framework of our indicators is $A_W = (9, 7, 5, 3, 1)^T$ and is written in Tab. 3.

Step 5. Determination of the optimal weights $(v_1^*, v_2^*, ..., v_n^*)$. Optimal weights are determined using a mini-max optimization model.

$$\min \sup\left\{\left|\frac{v_B}{v_i} - s_{Bj}\right|, \left|\frac{v_i}{v_W} - s_{iW}\right|\right\} \tag{13}$$

With conditions:

$$v_1, v_2, ..., v_n > 0 \wedge \sum_{i=1}^{n} v_i = 1 \tag{14}$$

This model is converted to the model:

$$\min \xi = \xi^* \tag{15}$$

Under conditions:

$$\left|\frac{v_B}{v_i} - s_{Bj}\right| \leq \xi \text{ and } \left|\frac{v_i}{v_W} - s_{iW}\right| \leq \xi \tag{16}$$

and $$v_1, v_2, ..., v_n > 0 \wedge \sum_{i=1}^{n} v_i = 1 \tag{17}$$

By solving this model, we obtain the optimal weights $(v_1^*, v_2^*, ..., v_n^*)$.

Step 6. The last step is to calculate the level of inconsistency using a robust index called the consistency ratio CR^{BW}, which is given by:

$$CR^{BW} = \frac{\xi^*}{CI^{BW}} \tag{18}$$

where: CI^{BW} – the consistency index.

The consistency index is for the number of indicators and at the same time for the maximum value of the relative importance scale in the pairwise comparison of indicators $n = a_{BW} = 5$ at the level of 2.30 (Dijkstra, 2011;

Tab. 3: Best-worst method

	Indicator				
	I2	**I3**	**I1**	**I4**	**I5**
Selected the best	I2				
Selected the worst	I5				
The best to others A_B	1	3	5	7	9
Others to the worst A_W	9	7	5	3	1
Optimal weights v_i^*	0.5246	0.2117	0.1270	0.0907	0.0460

Source: own

Mi et al., 2019). Using the solver Rezaei (2016b), we obtained the optimal value ξ* = 0.1104, and therefore CR^{BW} = 0.0480. The consistency ratio is a number from the interval [0, 1], and the smaller it is, the more reliable the results are.

ROA (I2) is consistently the most important indicator, especially emphasized by the best-worst and approximate Saaty methods. EBITDA margin (I5) and added value in sales VAS (I4) are considered the least significant across all methods. Weighting patterns are generally consistent, though best-worst tends to compress weights more modestly than the Saaty methods. Fig. 1 shows that the best-worst method tends to assign higher weights to the most important indicator (ROA) and lower weights to the less important ones, resulting in a more polarised distribution.

In contrast, the exact and approximate Saaty methods produce more evenly distributed weights, particularly between the top three indicators (ROA, ROS and ROE). This indicates a more balanced view of importance. The exact and approximate Saaty methods yield very similar results, reflecting the fact that the approximation does not significantly deviate from the exact calculation. The best-worst method emphasizes extremes more strongly, whereas the Saaty methods distribute importance more evenly.

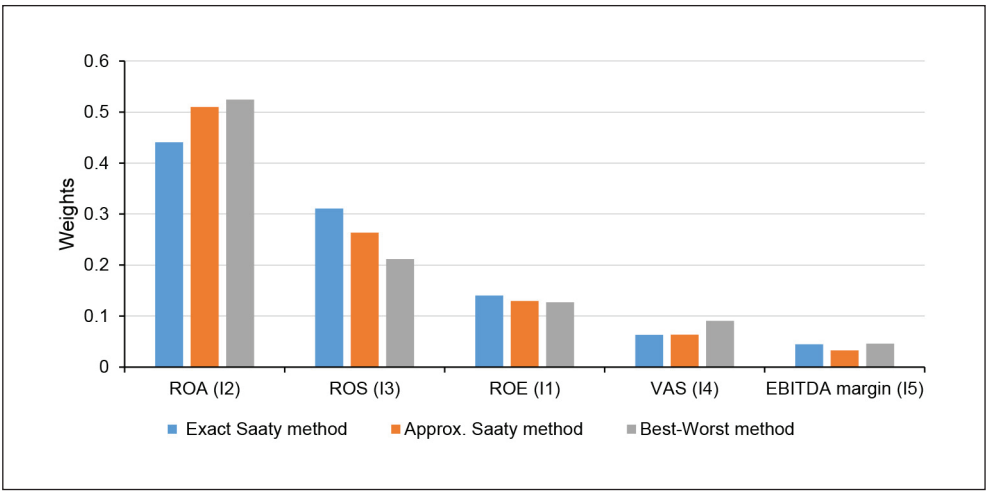

Fig. 1: Weights of individual profitability indicators

Source: own

The resulting indicator weights provide the basis for constructing a composite profitability index.

3 Results and discussion: Overall profitability index

This chapter presents the main findings of our investigation into selected profitability indicators. It recalls the procedure and data processing, and presents the results; specifically, the overall profitability index of accommodation facilities in Slovakia as determined in this study.

To reach a consensus on the "optimal" values, it was necessary to conduct a multi-round survey using a modified Delphi method. In this iterative process, experts were provided with anonymous summaries of the results from previous rounds, allowing them to revise their responses if they wished. The responses in the final round showed no significant deviations, and the final "optimal" values used in the construction of the profitability index were derived as the median of the experts' estimates. These values are reported in Tab. 4. The resulting weight coefficients and "optimal" profitability values formed the basis for constructing the profitability index for enterprises in the accommodation services sector. The index reflects not only the financial indicators themselves but also the expert consensus on their relative importance and target ("optimal") values, thereby providing a more context-sensitive tool tailored to this specific segment of the tourism industry.

Based on the optimal values of the individual indicators and the sectoral median values CRIBIS.SK (2025), we calculated the initial values

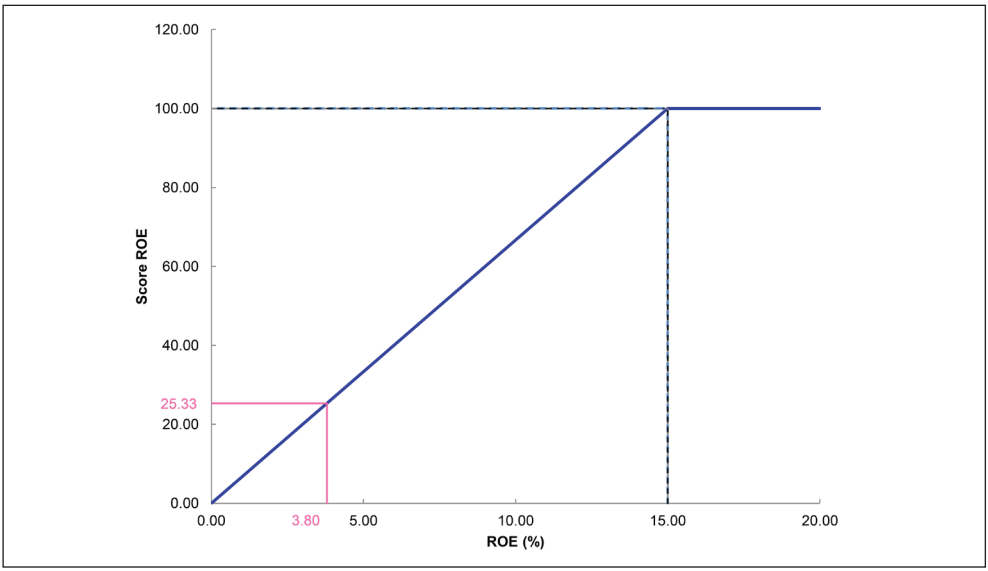

Fig. 2: Score of the profitability indicator ROE (I2) for year 2023

Note: The values displayed in purple – real value ROE (I1) and corresponding score for year 2023.

Source: own

of the indicators under study on a 100-point scale. All scores were determined within a linear relationship, as illustrated for the ROE indicator in Fig. 2.

The optimal value of each indicator is determined based on the responses of our experts and is always assigned a score of 100. A score of 0 is assigned to each indicator with a zero value.

The corresponding scores are reported in Tab. 4.

To improve orientation regarding the growing development of the data in Tab. 4,

Tab. 4: Scores of individual profitability indicators

	I2	I3	I1	I4	I5
Optimal value (median; %)	5	6	15	30	15
Relevant ratio					
CRIBIS.SK 2020 score*	−0.16 0.00	−0.26 0.00	−1.47 0.00	20.30 67.67	3.52 23.47
CRIBIS.SK 2021 score*	−0.01 0.00	−0.06 0.00	−0.14 0.00	17.36 57.87	4.45 29.67
CRIBIS.SK 2022 score*	0.01 0.20	0.00 0.00	2.35 15.67	23.36 77.87	6.83 45.53
CRIBIS.SK 2023 score*	1.02 20.40	0.79 13.17	3.80 25.33	25.59 85.30	8.43 56.20

Note: I1 – return on equity (ROE); I2 – return on assets (ROA); I3 – return on sales (ROS); I4 – value added share (VAS) in revenues; I5 – earnings before interest, taxes, depreciation, and amortization margin (EBITDA to revenues).
* row 1 – real values of the indicators from CRIBIS.SK; row 2 – the indicators scores directly proportional to the optimal values, which have a score of 100 points.

Source: own

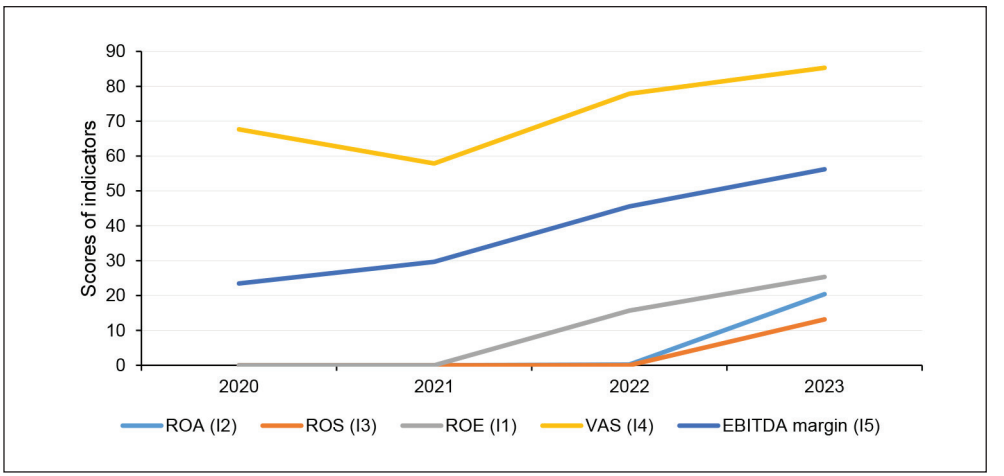

Fig. 3: The growth trend of the examined indicators scores on a scale of 100 points

Source: own

we also present a graphical representation of the development of the indicators examined on Fig. 3.

The overall profitability index for each year is calculated as the weighted arithmetic mean of the indicator scores, using normalised weights determined by the exact Saaty method, by the approximate Saaty method or the best-worst method as follows, see Tab. 5.

$$WAM = \sum_{i=1}^{5} v_i \times \text{score } I_i \tag{19}$$

All methods show consistently increasing trends, reflecting strong post-COVID recovery. The best-worst method yields the highest profitability scores each year. The exact and

Tab. 5: The overall profitability index (2020–2023)

Year	Overall profitability index			
	Exact Saaty method	Approximate Saaty method	Best-worst method	Average score (individual years)
2020	5.34	5.08	7.22	5.88
2021	4.99	4.66	6.61	5.42
2022	9.25	8.59	11.25	9.70
2023	24.56	24.44	27.03	25.34
Score range (2020–2023)	19.56	19.78	20.42	

Source: own

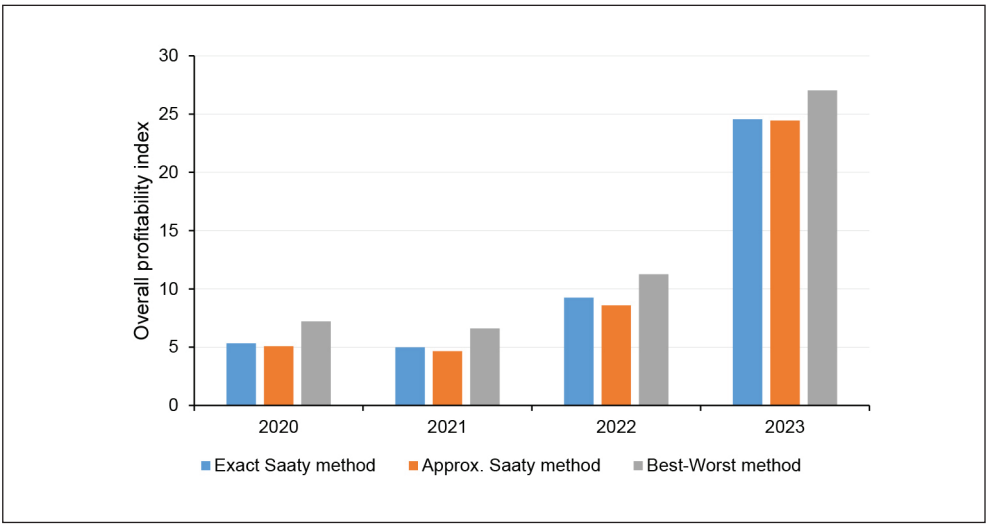

Fig. 4: The overall profitability index

Source: own

approximate Saaty methods closely track each other, especially in 2023 (Fig. 4).

The results provide a response to the formulated research question. The indicators ROA, ROS, and ROE emerged as the most significant, with ROA receiving the highest weight across all applied methods (exact Saaty, approximate Saaty, and best-worst). The value of the composite index varied depending on the weighting method: the best-worst method yielded the highest score, whereas the Saaty methods produced a more balanced distribution of weights. These findings confirm that the composite index enables a more comprehensive assessment of financial performance than individual indicators.

Comparison with the literature indicates that our results are consistent with Santos et al. (2022), who emphasize the importance of ROS; however, in our study, ROA emerged as the most critical indicator. Similarly, as noted by Maxim (2023) regarding the relevance of the EBITDA margin, our findings also underscore its significance, albeit with a lower

weight. Tangen (2005) and Costa and Costa (2024) highlight the need for a broader perspective on value creation, which is reflected in our composite index through the inclusion of the VAS indicator.

Moreover, the differences observed between the weighting methods suggest distinct approaches to indicator prioritization. The best-worst method accentuates extremes, which may be suitable in contexts, where identifying a dominant factor (e.g., ROA) is critical, whereas the Saaty methods provide a more balanced perspective, appropriate for complex decision-making. This distinction has practical implications: firms with high capital intensity may favor an approach emphasizing asset utilization efficiency. Furthermore, the results indicate that incorporating broader indicators, such as VAS, can better capture a firm's value-creation capability, which is particularly important during periods of economic turbulence.

Conclusions

The accommodation industry is currently navigating a period of recovery following a series of significant external shocks, including the COVID-19 pandemic, the energy crisis, and persistently high inflation. These disruptions have revealed structural vulnerabilities within the sector and highlighted the need for greater resilience, adaptability, and financial prudence. In response, accommodation providers are increasingly focused on eliminating operational inefficiencies, fostering continuous improvement, and leveraging technological innovations that streamline processes and enhance the overall guest experience. In this context of heightened uncertainty and economic pressure, ensuring long-term financial sustainability is paramount. Ensuring long-term financial sustainability in this context requires a more comprehensive approach to performance evaluation, moving beyond isolated profitability indicators toward composite indices that capture the multidimensional nature of financial health. Such indices facilitate more accurate benchmarking, allow analysis of performance trends over time, and provide strategic insights supporting informed decision-making. By integrating operational optimization with sophisticated financial performance monitoring, the sector can strengthen its competitive positioning and build resilience against future disruptions.

Although the proposed composite index has not yet been applied at the firm level, its calculation using sectoral data (CRIBIS.sk) demonstrates its practical applicability. The study has some inherent limitations typical for methodological research of this type. The expert panel comprised 14 respondents, which, while sufficient to ensure methodological rigor, may limit generalizability. Enterprise-level case studies were not included, which provides an opportunity for future validation at the firm level. Additionally, the use of median-based "optimal" indicator values offers a pragmatic approach to standardization, though future studies could explore more granular methods to capture sectoral heterogeneity. The analysis covers the period 2020–2023, providing insight into post-pandemic recovery, while longer-term trends remain to be explored. Future research could build on these foundations by expanding the expert panel, incorporating longitudinal data, and applying the index to individual accommodation facilities to further validate its effectiveness in identifying financial strengths and weaknesses and supporting strategic decision-making. Advanced weighting techniques, such as the fuzzy best-worst method with triangular or intuitionistic fuzzy numbers (Cheng & Chen, 2024), could also enhance the robustness and adaptability of the index in uncertain environments.

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Profitability index in the accommodation services sector in Slovakia

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Abstract

Considering evolving market dynamics, high fixed costs and vulnerability to external shocks, such as the impact of the ongoing global pandemic, it has become increasingly important to assess profitability in the accommodation sector. This study proposes a composite profitability index for accommodation services in Slovakia, which integrates traditional financial indicators such as return on equity (ROE), return on assets (ROA) and return on sales (ROS), as well as broader indicators such as the value-added-to-sales ratio (VAS) and EBITDA margin. Each indicator captures a distinct aspect of financial health, from operational efficiency to capital utilisation and value creation. To ensure methodological robustness, the study employs three expert-based weighting techniques: the exact Saaty method, the approximate Saaty method and the best-worst method. A panel of 14 experts in economics, finance and hospitality management participated in a Delphi-based survey to evaluate the relative importance and optimal values of each indicator. All methods ranked ROA as the most critical metric, followed by ROS and ROE, meanwhile, EBITDA margin and VAS were considered less significant, yet still essential, for a

comprehensive assessment. Using sectoral data and applying normalised scoring, the index captures profitability trends from 2020 to 2023. The aim of the study is to develop a composite profitability index for the accommodation services sector in Slovakia, based on the identified limitations of traditional indicators. The results show a marked post-pandemic recovery, with profitability index scores rising steadily across all weighting methods. Notably, the best-worst method yielded consistently higher index values, indicating its sensitivity to prioritisation extremes. This composite index provides accommodation businesses and policymakers with a practical tool for benchmarking, strategic planning and improving long-term financial sustainability in a volatile and competitive environment, offering a multidimensional framework for evaluating financial performance.

Author keywords

approximate Saaty method; best-worst method; exact Saaty method; Indicators; weights

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