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APPLICATION OF THE SYNTHETIC MEASURE OF TMR IN ASSESSING THE FINANCIAL HEALTH OF INDUSTRIES IN POLAND

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Purpose: The purpose of the study was to classify sectors of the Polish economy based on their financial condition, focusing on key indicators such as profitability, liquidity, debt, and operational efficiency. The aim was to identify sectors with stable performance and those facing financial challenges.
Design/methodology/approach: The analysis used financial ratio data from 2019 and 2022 for various sectors, applying the TMR (synthetic measure of development) method to evaluate and rank industries. Data were derived from the sectoral financial indicators compiled by the Commission of Economic Reporting and Analysis of the Scientific Council of the Accountants Association in Poland and InfoCredit.
Findings: The study revealed differences in financial performance across sectors. Certain industries demonstrated strong financial standing, while others showed weaknesses in key areas. The rankings helped highlight patterns of efficiency and risk.
Research limitations/implications: Limitations include the availability and quality of sector-level data and the use of a synthetic index that may overlook specific financial nuances. Future studies should integrate more macroeconomic variables and consider alternative comparative methods for deeper insight.
Practical implications: The findings can guide investors, entrepreneurs, and policymakers in identifying stable and at-risk sectors. Banks and financial institutions may use the results for credit assessments, while researchers may benefit from the classification in further sector-based analyses.
Social implications: Identifying financially vulnerable sectors may support targeted policy interventions, job market planning, and allocation of public support where needed most.
Originality/value: Unlike typical studies focusing on single indicators, this research offers a synthetic sectoral classification based on multiple financial metrics, providing a more comprehensive perspective.
Keywords: financial analysis, sectoral efficiency, sectoral competitiveness, TMR.
Category of the paper: Research paper.

1. Introduction

In a rapidly evolving economic environment, assessing the financial health of companies and entire sectors has become a crucial component of strategic decision-making. Financial indicators provide valuable insights into the stability, profitability, and value-generating capacity of entities. However, their interpretation can be complex, particularly when analyzing multiple entities simultaneously. Consequently, there is growing interest in methods that aggregate data and offer a synthetic overview of sectoral financial conditions.

The importance of developing robust tools for sector-level financial assessment has been highlighted in numerous international studies. Researchers emphasize that multidimensional frameworks are essential for identifying structural weaknesses, managing financial risk, and supporting long-term investment strategies (Zhao et al., 2022; Albulescu, 2020). Moreover, sector-specific diagnostics help public authorities design targeted policies, especially during periods of economic disruption (Hyršlová et al., 2019; Ahmad, Malik, 2009). According to Tarawneh et al. (2024), integrating aggregated financial data into sectoral analysis increases transparency and comparability—critical for both private investors and regulators.

One promising approach is the synthetic TMR measure, which enables a multidimensional assessment of financial indicators and a comparative evaluation of industries. This method facilitates the creation of rankings that identify the strongest and weakest sectors in terms of financial condition. It supports decision-making not only at the enterprise level but also within institutions responsible for economic policy.

The use of a synthetic indicator like TMR stems from the need to increase transparency and reduce subjectivity in financial analysis. Traditional assessments based on individual indicators may lead to conflicting conclusions, especially when different metrics signal divergent trends. TMR addresses this challenge by providing a comprehensive and unified perspective on sectoral financial performance, allowing investors, analysts, and policymakers to make better-informed decisions regarding investments, restructuring, or policy direction.

In addition to identifying overall sectoral health, the synthetic TMR metric highlights key drivers of financial performance, such as resilience to macroeconomic shifts, capital accumulation capacity, and operational efficiency. This allows the identification of sectors characterized by financial robustness, as well as those that may be vulnerable to market risks.

The analysis in this study is based on average values of key financial indicators for each sector, covering profitability, liquidity, indebtedness, and management efficiency. This enabled an objective and comprehensive comparison of financial conditions across industries.

The purpose of this article is to apply the synthetic TMR measure to assess sectors operating in the Polish economy based on financial indicators. The analysis aims not only to evaluate the current financial health of these sectors but also to identify the factors influencing their stability and to highlight potential risks and development opportunities in a dynamically changing

environment. The findings may serve as a valuable tool for forecasting economic trends and developing adaptive strategies for market participants.

2. Literature review

2.1. Review of domestic literature

In the literature, one can find a number of publications that use financial analysis tools in their research. Many of these publications use classical ratio analysis for comparative purposes. However, these comparisons are most often used to analyze the financial situation of a specific company in relation to the industry in which it operates. Here we can mention, for example, the research of A. Kopinski, who, using measures of profitability, evaluated and classified selected banks in Poland (Kopinski, 2016). M. Wilczynska conducted a study in which she used classical ratio analysis to assess the financial situation of the company under study, which was a limited liability company (Wilczynska, 2018). P. Bórawski assessed the financial liquidity ratios of individual farms. The research sample consisted of farms from the FADN region of Mazovia and Podlasie (Bórawski, 2008). K. Drabik et al. conducted an enterprise assessment using profitability indicators. The study was conducted on financial data from the Dino S.A. enterprise (Drabik et al., 2023). Enterprises in the construction, transportation and medical treatment industries were studied by E. Rabiej et al. The authors assessed the financial situation of enterprises in these three sectors using, among other things, ratio analysis (Rabiej, Lichota, Pitera, 2024). E.M. Kraska used indicator analysis to assess the impact of the COVID-19 pandemic on the financial situation of Polish enterprises (Kraska, 2022). K. Wiatrzyk, using ratio analysis, conducted a comprehensive assessment of the financial condition of Poland's largest fuel company, PKN ORLEN. In his research, in addition to the assessment itself, the author also made a number of comparisons of individual metrics and their dependencies (Wiatrzyk, 2018). Other studies worth mentioning include the analyses of the financial condition of a food company by M. Sankowska with Z. Koloszko-Chomentowska (Sankowska, Koloszko-Chomentowska, 2022), the evaluation of chemical and fuel industry enterprises by A. Majek and K. Osiesa (Majek, Ociesa, 2022), and the classical ratio-based analysis by M. Lesiak (Lesiak, 2022).

Another fairly common procedure in the literature is an attempt to evaluate a particular industry through the prism of the results that this type of business achieves. An example of such research is a study by M. Ganc and M. Wasilewski, who assessed the financial condition of dairy cooperatives (Ganc, Wasilewski, 2018). A. Zalewska and M. Sokol conducted a comprehensive analysis of construction industry enterprises using financial indicators across four dimensions: liquidity, profitability, debt and efficiency (Zalewska, Sokol, 2022). P. Figura

analyzed the values of indicators not for a specific industry, but in terms of enterprise size. The research sample consisted of companies classified as SMEs (Figura, 2015). M. Majewska and W. Pacuła conducted an assessment of the banking sector using profitability indicators (Majewska, Pacuła, 2016). Z. Golas made a multidimensional assessment of the food production sector, comparing enterprises from Poland and Germany across different size classes based on ECB data (Golas, 2016).

Studies to date have primarily focused on analyzing the financial condition of individual companies or sectors. However, there is a lack of comprehensive studies that simultaneously compare multiple sectors to classify them based on financial indicators. This research gap also includes the use of synthetic approaches, such as the TMR (Taxonomic Measure of Development), which facilitate the aggregation and comparison of multidimensional financial data.

The literature on sectoral financial analysis in Poland includes numerous studies that provide valuable context for understanding the diversity of economic performance across industries and support the use of synthetic measures such as the TMR index. Agnieszka Grzybowska (n.d.) emphasizes the role of human capital in driving sectoral development and competitiveness, highlighting non-financial determinants such as education and innovation capacity. Jegorow (2014) presents a long-term, non-structural analysis of economic entities by ownership sectors, providing useful insights for public sector assessment. Jędrzejczyk (2010) analyzes the financial condition of the tourism sector, pointing to macroeconomic and sector-specific factors that shape its performance.

Reports from the Polish Chamber of Commerce (2025) offer current financial overviews of various industries, complementing statistical sectoral assessments. Kosińska (n.d.) focuses on the cultural sector's financial structure and funding sources, while Zysińska (2019) addresses methodological issues in evaluating TSL companies, stressing the value of synthetic approaches. Owczarczyk (2010) examines the economic importance of SMEs, whose diversity must be reflected in cross-sector analyses.

The report by the Polish Economic Institute (2020) identifies strategic sectors in the EU and their role in long-term growth, which aligns with efforts to assess sectoral competitiveness. Additional insight is provided by the University of Gdańsk (2014), which analyzes the transport sector's financial constraints and regulatory risks. Famielec and Kożuch (2018) explore restructuring processes and financial strategies aimed at improving sectoral resilience. Szczukocka (2013) offers a comprehensive statistical overview of the services sector, which supports its inclusion in sectoral comparison studies. Finally, Florczak et al. (2018) provide a macroeconomic perspective on sectoral performance using econometric models.

2.2. Review of foreign literature

Foreign literature on the financial analysis of economic sectors, including both the sectoral approach and the analysis of enterprises within them, provides valuable conclusions contained in numerous key scientific publications. Among many such studies, it is worth mentioning the most important ones.

Sectoral analysis in the context of finance, performance, and capital structure plays a significant role in both domestic and international research. In recent years, studies have increasingly focused on the detailed examination of the financial sector's impact on the economy, corporate productivity, capital structure, and financial efficiency.

Tarawneh et al. (2024) conducted a systematic literature review on financial technology (fintech) and the profitability of the banking sector. The authors emphasized the growing importance of fintech as a driver of efficiency and profitability in financial institutions, highlighting its transformative role in the financial sector.

The importance of the financial sector for economic growth was also discussed by Bakar and Sulong (2018), who demonstrated a strong link between financial institution development and GDP growth. Similar conclusions were drawn by Ahmad and Malik (2009), who confirmed the positive impact of financial development on the economies of developing countries, although they noted that this effect depends on the quality of institutional environments.

Industry-specific analyses, such as the study by Hyršlová et al. (2019), demonstrated the use of financial analysis methods in the transportation and storage sector. The authors showed that traditional financial ratios may be insufficient for evaluating the condition of sectors under dynamic changes, suggesting the need for the use of multidimensional methods.

From the perspective of financial risk analysis, Zhao et al. (2022) presented a comprehensive overview of tools and methods for risk assessment using big data. This study emphasizes the growing relevance of modern analytical methods and artificial intelligence in assessing companies' financial conditions.

Albulescu (2020) examined the relationship between investment strategies and financial performance in the wine industry. He indicated that the impact of investment on performance depends on firm structure, size, and the surrounding market environment.

Capital structure has been the subject of numerous empirical studies. Szemán (2017) investigated the applicability of classic capital structure theories in the service sector, revealing differences in their relevance depending on the type of activity. Weill (2008), on the other hand, explored how the institutional environment influences the relationship between leverage and financial performance, showing that country-specific institutional conditions significantly affect the effectiveness of financial models.

Ziegler et al. (2010) proposed tools for the visual analysis of financial time series data, enabling better understanding of trends within specific sectors and facilitating inter-industry comparisons.

In the public sector, Kara (2012) discussed differences in financial analysis methods across the EU, Greece, and Turkey. He noted that variations in public sector accounting systems significantly hinder international comparability.

Joshi et al. (2013) examined the impact of intellectual capital (such as employee knowledge and customer relationships) on the financial performance of Australian financial institutions. They found a positive relationship between intangible resources and profitability.

Regarding strategic decisions in the banking sector, Sermpinis, Tsoukas, and Zhang (2019) analyzed factors influencing a bank's decision to go public. The study showed that such decisions are primarily driven by the bank's size, credit risk, and macroeconomic conditions.

Shalini and Biswas (2019) identified the determinants of capital structure for firms listed in the S&P BSE 500 index. Their research revealed that firm size, profitability, and growth opportunities are key factors shaping corporate financial strategies.

Chatzoudes, Chatzoglou, and Diamantidis (2022) studied the impact of internal and external factors on firm survival during economic crises. They emphasized that success depends on the interplay between internal competencies and external market or regulatory conditions.

Kanto and Martikainen (1992) provided a classic perspective on financial profiling of firms, demonstrating that selected financial indicators can predict a company's future performance using operational research methods.

In conclusion, the reviewed literature highlights the growing complexity of financial and sectoral analysis, which increasingly integrates traditional financial ratios with advanced tools such as big data analytics, visualization techniques, and non-financial indicators (e.g., intellectual capital). Moreover, it underlines the importance of contextual factors—such as institutional frameworks, market dynamics, and crisis resilience—which influence the effectiveness of financial strategies. This suggests a growing need for composite measures that synthesize multiple dimensions of financial condition, making synthetic indicators such as the TMR (Total Measure of Risk or Performance) particularly relevant in contemporary sector-level financial assessments.

These contributions collectively underscore the complexity of assessing sectoral financial condition and validate the use of synthetic measures, such as the TMR index, which allow for a multi-dimensional, comparative view of sectoral dynamics in a changing economic environment.

Future research in this area could include dynamic analysis of the financial health of industries over a longer time horizon, which would allow identification of trends and changes in the stability of economic sectors. In addition, it is worth considering the integration of indicator analysis methods with other approaches, such as predictive models based on artificial intelligence or analysis of macroeconomic factors affecting the financial health of various industries. In this way, it will be possible to understand even more fully the mechanisms shaping the economic situation of companies in different sectors of the economy.

Accordingly, the article attempts to classify the sectors of the Polish economy. The results of the study will fill the research gap in this aspect.

3. Research Methodology and Description of the Research Sample

The article uses data of financial indicators relating to the average values achieved by companies operating in Poland, broken down by economic sectors (divisions). The estimated values were taken from the Study of the Committee for Economic Reporting and Analysis of the Scientific Council of the Accountants Association in Poland, developed in cooperation with InfoCredit. The analysis covers two periods: 2019 (before the COVID-19 pandemic) and 2022 (the most current data available after the pandemic). Adopting this approach was intended to identify changes in the financial health of specific industries as a result of the economic turmoil caused by the pandemic.

The study established two research hypotheses:

- H1. There are significant differences in the financial health of individual sectors in Poland, as reflected in the value of the synthetic measure of TMR calculated on the basis of financial indicators.
- H2. Sectors with higher profitability and better liquidity obtain higher values of the synthetic measure of TMR, which indicates their more stable financial condition compared to sectors with higher debt levels and lower efficiency.

In order to verify the hypotheses, a synthetic measure of TMR was used, which allows a comprehensive assessment of the financial condition of the analyzed industries. The indicators included in the analysis covered all the key aspects of assessing the financial condition of enterprises, i.e. profitability, liquidity, debt and management efficiency. Thanks to the application of the TMR method, it was possible not only to compare the financial condition of various sectors, but also to assess the changes that occurred in the industry structure of the Polish economy during the analyzed period.

Considering the large number of available indicators, thanks to which it is possible to assess the financial condition of a company from various industries, the use of the TMR method is justified, as it allows the creation of a synthetic indicator, which will allow for a more comprehensive observation of this reality. The creation of a taxonomic measure of development (TMR) will allow the construction of a ranking of individual sectors, which will indicate which sectors present the best financial condition and whether significant changes have occurred in this respect. It is also important to indicate which of the indicators influence the improvement of the financial condition and can be assigned to stimulants, so with their increase the condition improves, and which ones destimulate the financial condition, which means that with their increase the condition decreases. Then, during the standardization process, the collected data

were transformed. This allowed determining how much a given indicator deviates from the average (Zeliaś, 2000):

$$\boldsymbol{zij} = \frac{\boldsymbol{x_{ij}} - \boldsymbol{\bar{x}j}}{\boldsymbol{Sj}}$$

where:
i – numbering of objects;
j = 1, 2, …, m;
m – numbering of adopted indicators.

The standardization performed allows obtaining a matrix of standardized values. On this basis, a taxonomic pattern was established (Zeliaś, 2000).

$$\boldsymbol{z_0} = [\boldsymbol{z_{01}}, \boldsymbol{z_{02}}, \dots, \boldsymbol{z_{0m}}],$$

assuming:

$$\boldsymbol{z_{0j}} = \begin{cases} \max\limits_{i}\{\boldsymbol{z_{ij}}\} \textbf{ for stimulants}, \\ \min\limits_{i}\{\boldsymbol{z_{ij}}\} \textbf{ for deterrents} \end{cases} \mathbf{j = 1, 2, \dots, m}$$

where:
i – numbering of objects,
m – numbering of adopted indicators.

Next, the similarity of objects to the abstract best object was examined by calculating the distance of each object from the developmental pattern (Hellwig, 1968):

$$\boldsymbol{d_{i0}} = \sqrt{\sum_{\boldsymbol{j=1}}^{\boldsymbol{m}} \left(\boldsymbol{z_{ij}} - \boldsymbol{z_{0j}}\right)^{\mathbf{2}}};$$

where: d_{i0}- value of the taxonomic development measure for the i-th object.

The obtained taxonomic measures of the development of the studied objects were normalized in the [0,1] interval using the transformation (Hellwig, 1968):

$$\boldsymbol{TMR_i} = \mathbf{1} - \frac{\boldsymbol{d_{i0}}}{\boldsymbol{d_0}},$$

accepting:

$$\boldsymbol{d_0} = \boldsymbol{\bar{d}_0} + \mathbf{2}\boldsymbol{S_0}$$

$$\boldsymbol{\bar{d}_0} = \boldsymbol{n^{-1}} \sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} \boldsymbol{d_{i0}}$$

$$\boldsymbol{S_0} = \sqrt{\boldsymbol{n^{-1}} \sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} \left(\boldsymbol{d_{i0}} - \boldsymbol{\bar{d}_0}\right)^{\mathbf{2}}};$$

where:
$\bar{d}_0$ – mean value of non-standardized taxonomic measures of development,
S_0 – standard deviation of unstandardized taxonomic measures of development.

The method was developed by Zdzisław Hellwig and is based on a constructed abstract object called a pattern (Szylar, Cegielska, Kudas, 2017). Creating a Taxonomic Pattern of Development is based on several key principles. At the beginning, partial indicators should be selected, which should (Nowak, 1990):

- represent the studied phenomenon as precisely as possible,
- have a relatively small amount of data,
- require the elimination of similar features or those providing similar information.

To assess the sectors of the Polish economy, the TMR indicator (pol. Taksonomiczna Miara Rozwoju) was selected, as it represents an advanced and comprehensive measure of resource utilization efficiency in the economy. Among the advantages of the TMR indicator, the following should be highlighted:

1. Possibility of cross-sectoral and international comparisons.

Thanks to its uniform methodology, TMR allows for the comparison of the efficiency of different sectors within a single economy, as well as in relation to the economies of other countries. This makes it a useful analytical tool in economic policy.

2. Avoiding erroneous conclusions.

Simple productivity indicators may suggest improved efficiency in a sector when, in reality, it results solely from increased inputs (e.g., more employees). TMR helps to avoid such oversimplifications by analyzing the actual contribution of efficiency to sectoral development.

3. Complementarity with other methods.

TMR does not replace other statistics (e.g., GVA, employment, investment inputs) but rather complements them, providing a more complete picture of a sector's condition. Its application in multifactor analysis increases the credibility and accuracy of the conclusions.

The choice of the TMR indicator for assessing the sectors of the Polish economy is justified by its comprehensive nature, its ability to capture systemic efficiency, and the possibility of cross-sectoral and international comparisons. Compared to other statistical methods, TMR provides deeper insight into the real sources of economic growth, making it a valuable tool for economic analysis and policy planning.

The next step is to divide the data into stimulants and destimulants. Indicators considered to be stimulants should have the highest possible value, because they have a positive impact on the studied phenomenon. In turn, destimulant indicators, the higher their values, the more negatively they affect the model (Bąk, 2018). In the context of the 14 sector indicators, they can be classified according to the above criteria. For example, profitability indicators will be stimulants, debt indicators – destimulants, and liquidity indicators – nominatives or stimulants – depending on the approach adopted. In the literature, one can find both positions that financial liquidity indicators are stimulants and nominants. For the purposes of calculating the TMR indicator, the position that they are stimulants was adopted.

The following indicators were used in the study:

- Operating return on assets,
- Return on equity,
- Net sales return,
- Sales return,
- Economic sales return,
- Financial liquidity ratio I,
- Financial liquidity ratio II,
- Financial liquidity ratio III,
- Receivables collection period,
- Liabilities repayment period,
- Inventory turnover,
- Fixed assets coverage ratio with equity and long-term reserves,
- Financing structure sustainability ratio,
- Total debt ratio.

Average values of indicators were adopted for both sectors and subsectors as well as individual industries. Justifying the selection of given indicators, it should be indicated that operating return on assets measures the operating efficiency of asset utilization. It shows how much profit from operating activities is generated from assets. The indicator is important in assessing the company's ability to generate profits without taking into account financial and tax costs. Another indicator is the return on equity (ROE) indicator, which indicates the degree of return for owners from the capital employed. It is crucial for investors and the assessment of the profitability of own financing. Next, the net sales return indicator should be indicated, which informs what part of sales revenues remains as net profit. It allows for the assessment of the cost and management efficiency of the company. Net sales return on sales indicates the profitability of sales before taking into account the net financial result, so it focuses on the core business of the company. Remaining in the area of profitability, an important indicator is the economic sales return indicator, which provides a broader perspective on sales efficiency. Taking into account financial liquidity, the liquidity ratio I, II and III was taken into account. Including them in the analysis allows for an assessment of whether companies are able to cover liabilities on different dates. The next two indicators concern liabilities in terms of collection and repayment, they indicate whether companies have problems with collecting liabilities from contractors and whether they are able to settle them on time. In the perspective of financial condition, the speed of inventory turnover is also important, it illustrates the efficiency of management and the risk of capital freezing. In the study, the area of analysis also included the ratio of coverage of fixed assets with equity and long-term reserves, which allows for checking how stable capital is financed with assets. The use of the financing structure sustainability indicator measures the share of fixed capital in asset financing, the indicator is important for

long-term stability and solvency. The last indicator included in the area of analysis is the total debt ratio, which informs about the general level of debt. In the study, it was assumed that this indicator is a destimulant.

The adopted indicators allow for a comprehensive analysis of the financial condition of the enterprise. Creating a model allows for observing enterprises through the prism of these 14 lenses without the need for a detailed analysis of each indicator separately.

The division of the economy into sectors and subsectors is presented in Table 1. Each sector is composed of several subsectors, to which industries of the economy are assigned.

Table 1.
Division into sectors and sub-sectors

Sector	Subsector
Sector 1: Agriculture, Forestry, Fisheries, and Mining	Agriculture, Forestry, and Fisheries
	Mining and Quarrying
Sector 2: Industry and Manufacturing	Food and Light Industry
	Wood, Paper, and Printing Industry
	Heavy, Chemical, Metallurgical, and Electronic Industry
	Automotive, Furniture, and Transport Equipment
Sector 3: Energy, Water Management, and Waste Management	Energy, Water Management, and Waste Management
Sector 4: Construction	Construction
Sector 5: Trade, Transport, and Logistics	Trade
	Transport and Storage
Sector 6: Media, Telecommunications, and Information Technologies	Media, Telecommunications, and Information Technologies
Sector 7: Financial, Business, and Professional Services	Financial, Business, and Professional Services
Sector 8: Consumer, Social, Cultural, and Recreational Services	Personal, Administrative, and Support Services
	Public and Social Services
	Gastronomy, Tourism, and Culture

Source: Own work.

The indicators adopted for individual industries are presented in Table 2 for 2019 and in Table 3 for 2022. The standard deviation, mean, coefficient of variation were also calculated and the maximum and minimum values were indicated. These results are also necessary to make calculations that will allow the creation of a taxonomic measure of development, which are indicated above.

Table 2 presents the values of indicators for 2019. In addition to the average values obtained by individual sectors, information on minimum and maximum values, standard deviation and coefficient of variation is provided. Individual variables are presented for 8 sectors: agriculture, industry, energy, construction, trade, media, financial services and consumer services.

Table 2.
Average values of indicators in 2019

	Operational Return on Assets	Return on Equity (ROE)	Net Profit Margin	Sales Profitability Ratio	Economic Sales Profitability Ratio	Current Ratio (First-Degree Financial Liquidity Ratio)	Quick Ratio (Second-Degree Financial Liquidity Ratio)	Cash Ratio (Third-Degree Financial Liquidity Ratio)	Accounts Receivable Collection Period	Accounts Payable Payment Period	Inventory Turnover Rate	Fixed Assets Coverage Ratio (Equity and Long-Term Reserves)	Financial Structure Stability Ratio	Total Debt Ratio
	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14
Standard deviation	2,4	5,0	2,3	2,2	2,1	1,0	1,0	0,7	11,7	6,6	22,4	1,8	0,0	3,2
Average	9,0	16,6	7,7	7,0	12,2	3,6	3,1	1,5	57,1	33,9	40,7	4,5	0,7	38,9
Max	12,3	24,1	11,9	10,4	14,7	5,3	4,9	2,7	73,6	43,0	83,3	7,0	0,8	44,7
Min	4,6	9,5	4,8	4,6	8,9	2,2	1,9	0,8	36,9	22,1	13,6	1,9	0,6	34,7
Coefficient of variation	26,3	29,9	29,5	31,7	17,5	27,6	32,6	42,8	20,5	19,3	55,0	39,9	5,8	8,1
Industries	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14
Sector 1: Agriculture, Forestry, Fisheries, and Mining	6,67	9,49	9,06	4,70	14,64	4,31	3,61	1,50	73,56	42,46	59,47	2,53	0,72	37,20
Sector 2: Industry and Manufacturing	8,39	14,68	5,51	5,89	8,92	2,76	1,92	0,75	51,21	37,31	54,24	2,77	0,67	41,26
Sector 3: Energy, Water Management, and Waste Management	4,56	9,63	4,81	4,94	14,74	2,22	1,99	1,03	43,36	29,98	13,57	1,86	0,77	38,89
Sector 4: Construction	12,34	24,08	9,82	10,12	13,02	3,24	2,60	1,12	63,39	42,97	83,28	5,63	0,65	41,11
Sector 5: Trade, Transport, and Logistics	11,53	21,74	7,38	7,32	10,19	2,57	2,22	0,95	57,83	34,67	28,01	4,75	0,63	44,70
Sector 6: Media, Telecommunications, and Information Technologies	9,17	16,18	7,51	7,95	12,19	4,20	3,61	1,84	62,25	32,26	34,57	6,49	0,70	35,04
Sector 7: Financial, Business, and Professional Services	9,06	17,02	11,92	10,44	13,86	5,31	4,92	2,66	68,10	29,51	38,75	6,99	0,72	34,73
Sector 8: Consumer, Social, Cultural, and Recreational Services	10,35	20,15	5,68	4,58	9,80	4,20	3,90	2,38	36,86	22,10	13,74	4,74	0,70	38,13

Source: Own work.

Table 3 contains the values of the indicators for 2022. Similarly to Table 2, in addition to the average values, the minimum, maximum, standard deviation and coefficient of variation are also presented. Similarly to 2019, the values concern 8 sectors.

Table 3.
Average values of indicators in 2022

	Operational Return on Assets	Return on Equity (ROE)	Net Profit Margin	Sales Profitability Ratio	Economic Sales Profitability Ratio	Current Ratio (First-Degree Financial Liquidity Ratio)	Quick Ratio (Second-Degree Financial Liquidity Ratio)	Cash Ratio (Third-Degree Financial Liquidity Ratio)	Accounts Receivable Collection Period	Accounts Payable Payment Period	Inventory Turnover Rate	Fixed Assets Coverage Ratio (Equity and Long-Term Reserves)	Financial Structure Stability Ratio	Total Debt Ratio
	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14
Standard deviation	1,8	4,8	1,6	1,3	2,2	0,4	0,4	0,3	7,5	4,5	12,5	1,0	0,0	3,2
Average	13,8	24,6	8,1	8,3	12,5	3,4	2,7	1,4	47,8	29,5	37,0	4,1	0,7	40,3
Max	16,8	34,3	11,1	10,4	16,2	3,9	3,3	1,7	58,2	36,8	58,3	5,0	0,7	45,8
Min	10,0	17,0	6,4	6,8	9,6	2,7	2,1	1,0	34,4	20,8	19,0	2,1	0,6	35,5
Coefficient of variation	13,3	19,4	19,4	15,9	17,6	11,7	15,8	19,7	15,7	15,1	33,8	23,9	6,4	8,0
Industries	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14
Sector 1: Agriculture, Forestry, Fisheries, and Mining	13,97	23,07	11,12	10,10	16,16	3,50	2,82	1,38	58,25	31,20	48,49	3,18	0,70	38,35
Sector 2: Industry and Manufacturing	13,10	21,90	6,93	7,54	10,44	3,12	2,13	0,98	46,32	33,33	58,29	3,62	0,65	42,59
Sector 3: Energy, Water Management, and Waste Management	10,04	17,03	6,37	7,34	15,40	2,70	2,29	1,18	41,93	28,16	19,00	2,11	0,75	41,08
Sector 4: Construction	14,50	27,06	8,42	9,37	11,71	3,28	2,60	1,19	56,27	36,78	45,00	5,01	0,63	43,11
Sector 5: Trade, Transport, and Logistics	16,80	34,29	6,37	7,13	9,57	2,93	2,37	1,09	42,50	30,55	32,23	4,96	0,60	45,81
Sector 6: Media, Telecommunications, and Information Technologies	13,12	21,64	7,80	7,90	11,75	3,86	3,33	1,72	51,35	28,65	35,13	4,90	0,69	35,54
Sector 7: Financial, Business, and Professional Services	13,77	24,75	9,75	10,38	13,83	3,83	3,32	1,64	51,39	26,37	36,90	4,65	0,70	36,83
Sector 8: Consumer, Social, Cultural, and Recreational Services	15,41	27,39	7,69	6,77	11,30	3,60	3,05	1,64	34,43	20,81	21,07	4,09	0,69	39,49

Source: Own work.

The presented values of the indicators constitute the basis for further comparative analysis of the financial condition of the industries. Their interpretation will allow to determine the key differences and relationships between the sectors of the economy. The next part of the article interprets the results, indicating the most important conclusions resulting from the synthetic TMR measure used.

4. Research results

By constructing a taxonomic measure of development from the presented indicators, a synthetic indicator was obtained, which allows for the creation of a ranking of sectors in terms of the financial condition of enterprises. Table x presents the ranking for 2019. It can be seen that the Financial, business and professional services sector was ranked first. Construction came next, followed by media, telecommunications and information technologies. The lack of difference in the TMR result between positions 2 and 3 is due to rounding to 3 decimal places. It is worth noting that the energy, water and waste management sector is in last place with a TMR result of 0.070, which significantly differs from the penultimate position of industry and production. Table 4 presents the ranking of sectors based on the financial condition of enterprises in 2019.

Table 4.
Ranking of sectors in terms of the financial condition of enterprises in 2019

Sector	Position in ranking	TMR Score
Sector 7: Financial, Business, and Professional Services	1	0,629
Sector 4: Construction	2	0,491
Sector 6: Media, Telecommunications, and Information Technologies	3	0,491
Sector 1: Agriculture, Forestry, Fisheries, and Mining	4	0,394
Sector 5: Trade, Transport, and Logistics	5	0,266
Sector 8: Consumer, Social, Cultural, and Recreational Services	6	0,250
Sector 2: Industry and Manufacturing	7	0,187
Sector 3: Energy, Water Management, and Waste Management	8	0,070

Source: Own work.

In 2022, the situation changed. Companies from the agriculture, forestry, fishing and mining sectors came first with a TMR score of 0.562. Financial, business and professional services came second with a score of 0.555. There is a difference in TMR between construction and media in 2022, but it is still very small. Considering the sectors that close the ranking, it is necessary to indicate energy, water and waste management with a worse result than previously. The ranking of sectors according to the financial condition of enterprises in 2022 is presented in Table 5.

Table 5.
Ranking of sectors in terms of the financial condition of enterprises in 2022

Sector	Position in ranking	TMR Score
Sector 1: Agriculture, Forestry, Fisheries, and Mining	1	0,562
Sector 7: Financial, Business, and Professional Services	2	0,555
Sector 4: Construction	3	0,455
Sector 6: Media, Telecommunications, and Information Technologies	4	0,423
Sector 8: Consumer, Social, Cultural, and Recreational Services	5	0,250
Sector 2: Industry and Manufacturing	6	0,227
Sector 5: Trade, Transport, and Logistics	7	0,203
Sector 3: Energy, Water Management, and Waste Management	8	0,060

Source: Own work.

It can be seen that TMR results are more balanced in 2022 than in 2019. This is particularly visible in the top four. In 2019, the difference between 1 and 4 results was 0.235 and in 2022 0.139. The results of the TMR sector study confirm the first hypothesis, which stated that there are significant differences in the financial condition of individual sectors in Poland, which is reflected in the value of the synthetic TMR measure calculated on the basis of financial indicators. Large differences are observable in individual sectors. Detailed results also indicate discrepancies in the scope of individual industries that make up the sectors given in the study. Also in terms of the second hypothesis, which was that sectors characterized by higher profitability and better financial liquidity obtain higher values of the synthetic TMR measure, which indicates their more stable financial situation compared to sectors with a higher level of debt and lower management efficiency. there are visible relationships that may confirm it. Industries with high profitability and liquidity such as Sector 7: Financial, Business and Professional Services or Sector 4: Construction achieve a higher TMR measure than those with low or moderate profitability and liquidity but higher debt.

5. Conclusions

The study The study was conducted to assess the financial condition of various sectors of the economy in Poland using the synthetic TMR measure, which takes into account key economic indicators such as profitability, financial liquidity, debt level, and management efficiency. Data for 2019 and 2022 were analyzed, allowing not only the evaluation of the situation in a given period but also the observation of changes over time.

The results clearly confirm the first hypothesis (H1), indicating significant differences in financial condition across sectors. In both years, substantial variations in TMR values were observed. Particularly high stability was recorded in the financial, business, and professional services sector, consistently ranking at the top. Conversely, the energy, water, and waste management sector remained at the bottom, signaling a relatively weaker financial standing.

Notably, in 2022, agriculture, forestry, fishing, and mining emerged as the top-ranked sector. This shift may reflect improved efficiency and financial performance, potentially due to subsidies, regulatory changes, or favorable economic conditions. Such developments demonstrate that sectoral financial health is dynamic and influenced by macroeconomic and structural factors.

The persistently low position of the energy, water, and waste management sector may point to systemic challenges, including underinvestment, regulatory constraints, and limited adaptability. Given the ongoing energy transition and growing environmental expectations, this sector warrants special policy and investment attention.

Regarding the second hypothesis (H2), the analysis supports a positive relationship between profitability and liquidity levels and the synthetic TMR value. The study confirms that cash-flow-based indicators provide a more accurate reflection of financial stability than accrual-based metrics. This finding justifies the inclusion of a liquidity ratio in the TMR model (Seretidou, Billios, Stavropoulos, 2025). Sectors with low debt and high profitability recorded higher TMR scores, suggesting that the measure effectively reflects actual financial health and is a valuable tool in comparative sector analysis.

Importantly, the 2022 distribution of TMR values was more even, particularly among top-performing sectors. This may signal greater resilience to external shocks and more effective financial management practices post-pandemic. It could also reflect the increasing professionalism in corporate financial governance and broader adoption of analytical tools. Ultimately, the financial health of a sector is shaped by the performance of individual firms, which operate in diverse environments and under varying constraints (Nagy, Valaskova, 2023). As illustrated by research on the Tehran Stock Exchange, financial indicators remain essential in assessing the financial standing of listed companies, further supporting the relevance of synthetic approaches like TMR (Alyasari et al., 2024).

The findings of this study may have wide-ranging practical applications—from supporting investment decisions and public support allocation to enhancing risk assessment in financial institutions. The use of a single, synthetic measure fosters a more holistic understanding of sectoral financial performance and facilitates strategic decision-making.

5.1. Limitations of the study and directions for further analysis

The main limitation of this study lies in its reliance on aggregated sector-level data, which may obscure intra-sectoral disparities. Additionally, while TMR is useful for comparative evaluation, it does not identify root causes of financial outcomes—only their effects. The study is also limited to two years of analysis, suggesting the need for longitudinal research to capture trends and cyclical changes.

Future research should consider applying TMR at the firm level within individual sectors to uncover deeper insights. Moreover, integrating TMR with predictive models—such as credit scoring or bankruptcy prediction—could enhance tools for assessing financial stability. Another promising avenue is the development of sector-specific dashboards that visualize TMR results in real time, offering policymakers and analysts a dynamic view of industry performance. Embedding TMR into public policy frameworks could improve the precision of fiscal interventions, while its application in credit risk modelling could strengthen financial oversight and risk management across sectors.

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