

RELATION BETWEEN CRITERIA FOR EVALUATION OF MARKET COMPETITION

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The modern market environment is undergoing a phase of declining globalization, which significantly reduces the scope for companies to operate comfortably. As competition intensifies across all markets and segments, businesses face unprecedented challenges. Leaders need to understand the level of market competition in each segment to make well-informed decisions. This article explores the most well-known methods for determining market concentration and assessing the level of competition. By comparing the advantages and disadvantages of these methods, the article elucidates the interrelationships among various competition assessment criteria and their implications.

Purpose. Understanding the level of competition in markets is critical for managers in their decision-making process. The numerous methods available for assessing competition can complicate this process. This article aims to summarize the existing methods for evaluating competition and identify the relationships between their evaluation criteria.

Design/methodology/approach. This paper reviews and synthesizes techniques for assessing market competition that have been developed by researchers over the past several decades. The study employs a range of research methods, including analysis, synthesis, generalization, analogy, comparison, systematization, and graphical methods, to determine the relationships between different assessment criteria. This approach ensures a thorough examination of the methods and provides a robust framework for understanding their applicability.

Findings. The study identifies and reviews prominent methods for assessing market competition, analyzing market structure, and calculating the market power of enterprises. These methods, proposed by scholars since the inception of this field, reveal that existing techniques can be categorized into distinct groups based on their evaluation criteria. The analysis highlights that despite the apparent simplicity of some formulas, calculating indicators related to market power remains challenging due to difficulties in obtaining accurate and objective data on profitability and, particularly, on the costs incurred by competitors.

The most accessible and frequently used indicators are those derived from market structure analysis and concentration assessments. These methods are prevalent in practical applications, especially in anti-monopoly legislation, due to their effectiveness in assessing competitive dynamics and market power.

Practical implications. Understanding the factors that determine market competition and shape an enterprise's market power will enable management to make quick and effective decisions regarding new products and markets. The presented correlation of various competition assessment

methods and their structuring will assist in selecting the appropriate assessment method and avoid unproductive expenditure of time and resources on additional research.

Originality/value. The structures and groupings of competition assessment methods provided in this paper offer a new, more comprehensive perspective on market concentration and market power. This perspective not only enhances the understanding of these concepts but also reflects their impact on enterprise profitability. The findings contribute to the ongoing development and refinement of both existing and novel methods for assessing market competition, thereby advancing the field.

Keywords: Competition, Market concentration, Market power of an enterprise, Competitiveness, Cross elasticity of demand.

Paper type: Research paper.

The problem statement

Insufficient information about existing and potential markets presents a significant challenge for managers. While internal information about the enterprise is typically readily available in digital form, up-to-date, and includes a range of pre-generated quality reports, the situation is different with external information. External data, particularly concerning market activities, is often fragmented, inaccessible, or not aggregated in a useful manner. This lack of comprehensive market data complicates the task of understanding market dynamics.

Managers face difficulties in acquiring reliable and current external information about market structure, competitive intensity, and market advantages. Such data is crucial for making informed decisions, as it helps in assessing market opportunities, understanding competitive pressures, and devising effective strategies. The scarcity of aggregated market data, coupled with its often proprietary or confidential nature, can hinder the ability to perform thorough market analysis.

The necessity to gain insights into market conditions, evaluate competition, and identify competitive advantages has directed the focus of this research. This study aims to address the gaps in market information by exploring methods for assessing market structure and competition. By developing and refining approaches for evaluating these aspects, the research seeks to provide valuable tools for managers to better understand their competitive environment and make strategic decisions based on a more comprehensive analysis of both internal and external factors.

Understanding the market's structure and competitive dynamics is essential for formulating strategies that enhance market positioning and ensure resilience against competitive threats. This research addresses these needs by investigating methodologies that can offer deeper insights into market conditions and improve decision-making processes.

Businesses must employ reliable methodologies for assessing market conditions and competition to operate effectively and succeed in today's competitive markets. The complexity of modern markets demands not only surface-level analysis but also a deep understanding of both direct and indirect factors influencing market power and competition. By investigating these methodologies, this research aims to establish a comprehensive framework for evaluating market structure. Such an approach not only facilitates strategic planning but also provides managers with the tools necessary to anticipate and respond to competitive pressures. The following sections will explore various methods used to measure market dynamics, highlighting their development, applications, and the insights they offer into market behaviour.

Thus, managers should not only be able to process information and use available methods of market analysis, but also understand the process of selecting and applying specific methods. The best way to do this is to summarise and systematise existing methods, understand their interrelationships, and, most importantly, take into account the relationships between the criteria for evaluating different methods of market structure research.

Methods for assessing market structure, also referred to as methods for determining market power or evaluating market competition, have been developed and refined over more than a century. These methods

are crucial for understanding competitive dynamics and market power. Generally, the methods can be categorized into two broad groups based on their assessment approach.

The first group consists of direct assessment methods, which rely on analysing the direct market shares of competitors. To utilize these methods, one must gather data on the number of market participants and their respective market shares. These methods are straightforward and involve calculating market concentration ratios such as the Concentration Ratio (CR) and the Herfindahl-Hirschman Index (HHI). They provide a clear snapshot of market dominance and competitive intensity based on observable data.

The second group involves more complex assessments, where calculations are based on the results of a company's activities, its capabilities, and the potential actions of competitors. These methods assess competition indirectly through factors such as market entry barriers, strategic behavior, and the overall competitive environment. They often involve subjective judgments and estimates derived from various qualitative and quantitative analyses. Techniques in this group include structural analysis, game theory models, and behavioural approaches, which aim to capture the nuances of competitive interactions and the potential for market power abuse.

Literature review

Scientists in many countries have developed dozens of methods for studying market structures. At the same time, the vast majority of such studies describe one, usually proprietary, method or are based on an analysis of several of the most well-known ones. There is virtually no systematic and thorough simultaneous study and comparison of many existing methods and their improvements.

One of the first tools used to assess the level of competition in the market was the market concentration index (CR). This index is determined directly based on the market shares q of the largest firms on the market according to the formula (European Central Bank [ECB], 2019):

$$CR_q = \sum_{i=1}^q MS_i \quad (1)$$

here CR is ratio concentration index, q - the number of firms with the largest market share (MS).

An important stage is the selection of the parameter q of the number of the largest firms on the market, which are taken for calculation. Most often, the evaluation is limited to 10 companies, sometimes up to 50 companies. It is obvious that with such numbers of participants, the market share of the firm becomes less than 1% and slightly affects the value of the CR index.

Calculation of market shares (MS) is carried out in the usual way (ECB, 2019):

$$MS_{i,t}^s = \frac{SV_{i,t}^s}{\sum_{i=1}^{N_t^s} SV_{i,t}^s} \quad (2)$$

where SV is sales volumes, N is the quantity of companies in segment or industry s and t – time period. This formula means that in order to calculate the CR index, we need to define formal restrictions regarding the industry, product group and time period.

Calculation of market concentration is used more often to analyze markets that have signs of monopoly and oligopoly. For such structures, the Herfindahl-Hirschman index (HHI) index is more sensitive (US Department of Justice and the Federal Trade Commission [USDJ&FTC], 2023). Market shares are squared, which causes the contrast of the concentration level to increase (Herfindahl, 1950):

$$HHI = \sum_{i=1}^N MS_i^2 \quad (3)$$

If the value of the index HHI approaches zero, it means that the market is close to perfect competition. If the index reaches 10000 (100% of market), the market is a monopoly.

Both indices have practical applications in the antitrust regulation of the United States of America. In addition to the current value of the index, the size of the index change is also subject to control.

Table 1

Indicators of Thresholds for Structural Presumption (USDJ&FTC, 2023)

Indicator	Threshold for Structural Presumption
Post-merger HHI	Market HHI greater than 1,800 AND Change in HHI greater than 100
Merged Firm’s Market Share	Share greater than 30% AND Change in HHI greater than 100

Source: 2.

Formulating hypotheses and setting goals

In light of the challenges presented by insufficient and fragmented external market information, this research seeks to address several key hypotheses and objectives. The primary hypothesis is that the existing methodologies for assessing market structure and competition can be effectively refined to provide more comprehensive and actionable insights. Specifically, it is hypothesized that a combination of direct and complex assessment methods will offer a more nuanced understanding of market dynamics than traditional approaches alone. Accordingly, the purpose of this article is to summarise and systematise the existing methods of valuation of market structures and to identify the links between the main valuation methods.

Methods of the research

The article is based on the work of both domestic and international scholars, along with real-world practices from antitrust regulatory bodies. To better understand how competition works in different markets, the author applied several methods, including analysis, comparison, and grouping. These methods were used to create a structured approach to evaluating the level of competition in the market. By combining academic insights with practical experience, the article aims to offer a clearer picture of how market competition can be assessed and understood. The article also analyses applied methods of studying the market structure, in particular, the combination and comparison of direct and adaptive methods allows for the optimal choice of the method of studying the market structure and its dynamics.

Results

In addition to the two most well-known methods of assessing market structures, scientists have proposed many others.

The results of the analysis and comparison of the existing methods of assessing the level of market concentration are presented in the form of a diagram below. In general, the existing methods can be divided into two groups.

The above-mentioned direct methods of calculating the degree of concentration allow for a quick and unbiased assessment of the level of competition in the market. For such a study, it will be sufficient to know only the market share (sales) of each participant and their total number.

Determining the type of market and the complexity of its structure is usually not the goal of scientific research, it is usually only one of its initial stages. For a complete and in-depth study of the market and its various types, more specialised and thorough methods should be applied. In order to cover a wide variety of market research objects and obtain deeper characteristics, it is proposed to use adaptive methods for assessing market structures. Adaptive methods have a different positioning, they are more difficult to apply, but they provide more information about the market.

The main difference between adaptive methods and direct methods of market research is the ability to ‘tune’ certain parameters depending on the purpose of the study, type of market, and level of concentration.

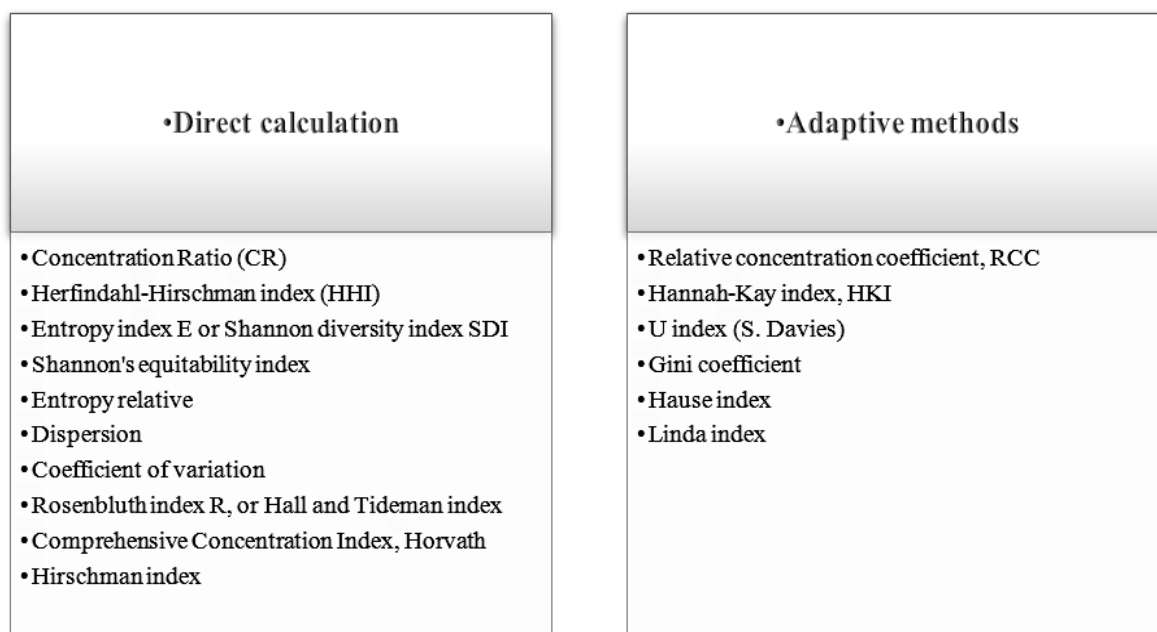


Fig. 1. Methods for determining the level of market concentration

Source: 1-8,10-12,19-22.

Adaptive methods can help in analysing time series, finding the market 'core', levelling the research of differently structured markets, studying the market regardless of the level of concentration, and identifying signs of collusion among market participants.

At the same time, the weakness of these methods is the high requirements for specialists who use them, in particular in the field of economics, mathematics and statistics. For example, the Gini coefficient or the U-index require not only the selection of individual parameters for calculation, but also the selection of individual formulas, equations or calculation methods.

The Linda index and the Gini coefficient have the most practical application of the adaptive indices

The Gini coefficient is a statistical indicator based on the Lorenz curve, which reflects the unevenness of the distribution of a certain characteristic, in the case of a concentration of sellers in the market, it shows the relationship between the percentage of enterprises on the market and the market shares calculated by the cumulative total, from the smallest to the largest.

The Linda index is calculated for only a few of the largest companies and therefore also does not take into account the full market situation. However, unlike the concentration index, it is focused on a formally defined core, such as an oligopolistic market. That is, this index has a more applied and specialized application.

The next group of indices provides an indirect assessment of the market structure, it directly shows the strength of the seller's market power through economic indicators.

The most famous indicator of this group is the Lerner index (Lerner, 1934):

$$L = \frac{P - MC}{P} \quad (4)$$

where is P – price, MC – marginal costs.

The Lerner index essentially shows the degree of price deviation from marginal cost. At the same time, this index does not directly reflect the state of competition on the market and the methods of managing the firm's expenses. The main disadvantages of Lerner's method are: the static nature of the calculation model, the lack of understanding of the company's competitive strategy, the reasons for the competitive advantages of various markets.

Less well-known methods of assessing a firm's market power are listed below in Table 2.

Table 2

Indices of market (monopoly) power

№	Formula	Comments
1	$\varepsilon_{BA} = \frac{\Delta Q_B}{\Delta P_A} \frac{Q_B}{P_A} = \frac{P_A}{Q_B} \frac{\Delta Q_B}{\Delta P_A}$	Cross elasticity of demand
2	$PCM = f(D, N)$ $D = \sum_{i=1}^{n-1} MS_i - MS_{i-1}^2$	Price-cost margins (PCM), Dominance Index Kwoka
3	$m = \frac{\tan a}{\tan b}$	Rothschild's Index
4	$R_{qivj} = K_j N_{qivj}$	Papandreou's Index of monopoly power
5	$PSI = \begin{cases} 1, s_i > S - D, \\ 0, s_i \leq S - D \end{cases}$ $TS_{PSI=1} = \frac{T_{PSI=1}}{T}$	Pivotal Supplier Index (PSI)
6	$RSI_i = \frac{S + I - E - s_i}{D}$	RSI (Residual Supply Index)
7	$\beta = 0,1(\beta^k + \beta^f + \beta^m + \beta^e + \beta^{tr} + \beta^{ec} + \beta^d + \beta^s + \beta^{bp} + \beta^m + \beta^n)$	Coefficient of coherence of competitive strategies (Gerasimenko)
8	$LI = \frac{P - MC}{P}$	Lerner Index
9	$PCMI = PCMU = \frac{P - MC}{MC}$	Mark-up index (PCMU, PCMI)
10	$L^* t = 1 - \frac{MC + \lambda_{c,m}(t)}{P^m(t)}$	The instantaneous value of the Lerner index according to Pindyck.
11	$BI = EP = R - C - D - iV$	Bain Index
12	$y = f(CR_4, G, C, O, P-C, GM, u)$	Industry price-cost margins, (Rhoades, Cleaver)

Source: 3, 6-8, 10-12, 18, 19, 26.

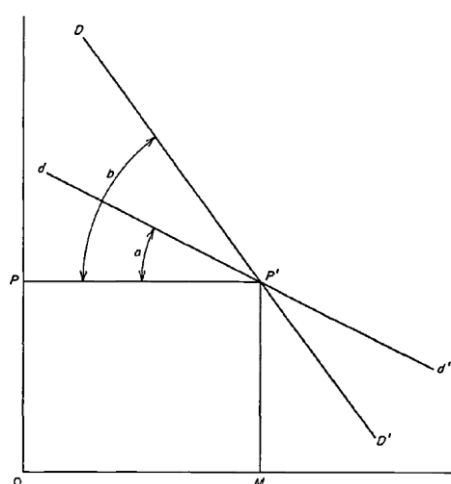


Fig. 2. The impact of competitors on the demand curve.
Changes in the tangent of the angle determine competitiveness: the Rothschild's index

Source: 6.

The figure below shows the basis for determining the slope angles (a and b) of the demand curves for the Rothschild's index.

In summary, it should be noted that indicators of assessing monopoly power utilize two bases, the first of which is profitability, and the second is the elasticity of product substitutes.

Profitability assessments are based on: the Lerner index, the Bain index. On the level of substitutability, they rely on: the Cross-elasticity demand index, the Rothschild index, the Papandreou index.

A review of the above approaches to defining market power of enterprises shows the breadth of ways to define it. For example, compared to the analysis of market structures, this system of indicators does not have clear links and covers a wide range of arguments that define market power.

The direction of causality of the indicators should also be noted. After all, profitability is a fairly objective indicator of a company's success and market power. But at the same time, it is the result of the interaction of many elements of the enterprise system: production, finance, customers, logistics, etc.

The common feature of the approaches under consideration is the revenue part of the economic result, the price, but at the same time, the greatest variety of approaches is identified in the formation of the cost part. That is, which cost elements determine the market power of an enterprise through profitability. Given the difficulty of obtaining objective data for calculations, the most accurate indicators are cost-effectiveness and reduced operating profit.

Results

The analysis of methods for calculating various ways of determining the level of competition in the market allowed us to divide them into several groups based on certain characteristics.

For the first level of classification, it is proposed to use the attribute of the object of research. Some methods assess the market power of enterprises, while others focus on a formal analysis of the market structure.

The next level of classification was formed by using different signs. For the methods of assessing market power, the criteria were again the assessment arguments: indicators of profitability or the degree of market protection. For the methods of studying market structures, the more convenient feature was the calculation methods: simpler formulas ready for immediate calculation and complex approaches requiring some adaptation for each situation. The result of this division into groups made it possible to form the structure shown in Fig. 3.

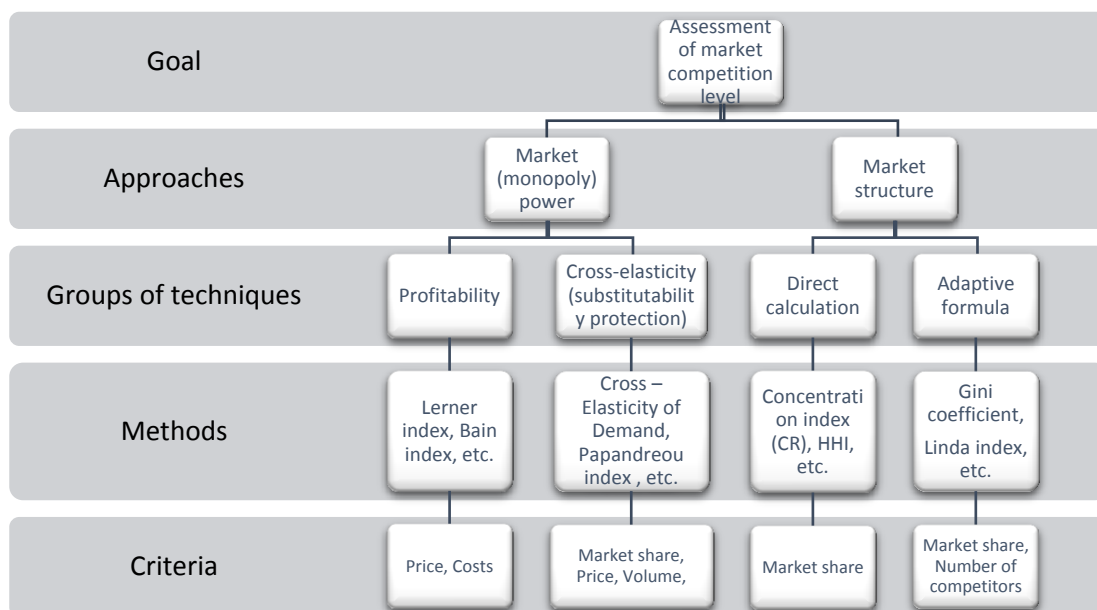


Fig. 3. Methods and criteria of assessing market structure and market power

Source: structured by the author.

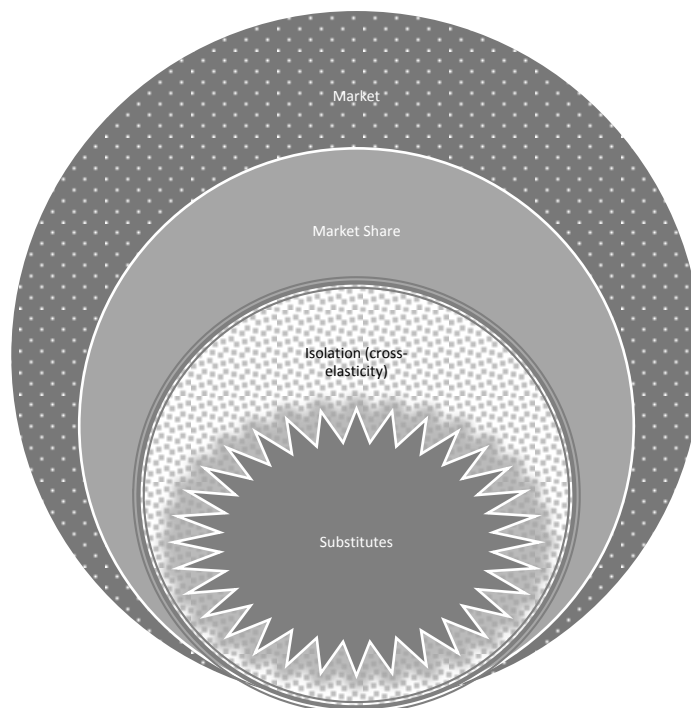


Fig. 4. The relationship between criteria for evaluating market structure

Source: proposed by the author.

Of course, it should be noted that the provided generalization employs certain simplifications, as the models of the authors are complex. Beyond the generalization, factors such as time, cost considerations, administrative efficiency, the nature of monopoly, etc., are excluded.

Importantly, the classification of methods shown in Figure 3 should not lead to the choice of only one group or one method. In each case, depending on the situation, it is recommended to use several methods from different groups.

The aforementioned criteria are in dynamic balance. That is, a larger market share allows for increased profitability of the company. At the same time, profit growth enhances the supply of other markets through cross-elasticity. Which in turn leads to an increase in supply and a decrease in profitability.

The diagram of the simple elements that determine the level of market competition is shown in Fig. 4.

All of the methods considered are based on one or more of the following criteria: market share, cost elements, price. Based on this, managers should consider the availability and accuracy of relevant information sources when selecting specific research methods.

Conclusions

As a result of the review and analysis of the most well-known methods for assessing market competition, two groups of indicators have been identified. The first group of indicators describes the market situation based on information about competitors' market shares, ratings, etc. The second group focuses on assessing the market power of a particular firm. The method of assessing market power is based on the calculation of the profitability of the enterprise (product) or on determining the degree of protection of the market share from substitutes. The main sign of market protection is the cross elasticity of demand.

The paper identifies the main groups of criteria that allow for a numerical study of the market structure. The first group of criteria relates to market share, rank of the enterprise, and number of market participants. The second group concerns cost elements, such as marginal costs, gross costs. The third group relates to the price of the product, the price elasticity of the product.

Figure 4 shows a visualization of the correlation of the above concepts. The area of the figure labeled “Market Share” is synonymous with market power and profitability. An increase in market share and, consequently, profitability will stimulate the emergence of substitute products, i.e., the impact on the protected market will increase accordingly. In fact, the cross-elasticity of demand will be a natural constraint on margins.

The study found that the formal criteria used in market structure analysis methods can be divided into three main groups: market share, costs and product price. The methods themselves investigate various correlations and interrelationships between the individual selected criteria.

Prospects for further research

The existing system of indices and indicators for assessing the level of market competition can be supplemented and expanded with both established and innovative methods. Particular attention in future research should be directed toward developing an algorithm for selecting the most suitable method or combination of methods for assessment in specific contexts, considering the diverse nature of industries and markets. Additionally, the challenge of simplifying these methods in relation to the availability and quality of source data necessitates further scientific exploration. This is especially critical, as many of the methods proposed by researchers remain impractical due to the complexities and constraints involved in acquiring the required data. A more streamlined and adaptable approach would enhance the applicability of these methods in real-world market assessments.

Further study of the evaluation criteria in terms of data availability, relevance and reliability will be of great practical importance. Despite the large number of methods, the vast majority are very difficult to use in practice.

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В. С. Титаренко

Львівський університет бізнесу та права,
кафедра економіки підприємств та інформаційних технологій,
tytarenko@gmail.com

ВЗАЄМОЗВ'ЯЗОК КРИТЕРІЇВ ОЦІНКИ РИНКОВОЇ КОНКУРЕНЦІЇ

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Мета статті – розглянути, систематизувати наявні способи визначення рівня конкуренції на ринку. Сучасне ринкове середовище є на стадії послаблення глобалізації, перебудови регіональних ринків і не залишає вільного простору для комфортного існування компаній. Усі ринки та сегменти дедалі більше зазнають впливу конкуренції. Керівникам підприємств необхідно розуміти рівень концентрації ринку в кожному сегменті, щоб приймати правильні рішення залежно від його структури. Для визначення типу ринку та його структури вчені протягом останніх 100 років запропонували численні методи дослідження ринкової структури. Розглянуто найвідоміші методи визначення концентрації ринку, зокрема Індекс концентрації

(CR), Індекс Герфіндаля-Гіршмана (HHI), коефіцієнт Джині, індекс Лінда та інші. А також способи оцінки ринкової влади підприємства: індекс Лернера, індекс перехресної еластичності попиту, індекс прибутковості Байна та інші.

Прикладне застосування отримали методи оцінки ринкової концентрації, що базуються на ринкових частках та кількості конкурентів. Це пов'язано із доступністю даних та легкістю розрахунку. Зокрема, індекси концентрації (CR) та індекс Герфіндаля-Гіршмана (HHI) вже тривалий час застосовуються в американському та європейському антимонопольному законодавстві.

Узагальнення та аналіз згаданих індексів та їх формул дали можливість визначити головні групи критеріїв для оцінки ринкової структури. Такими визначені: ринкові частки конкурентів, рівень прибутковості фірми та рівень перехресної еластичності попиту щодо замінників.

Критерії оцінки ринкової структури та ринкової сили є в динамічному балансі. Перехресна еластичність попиту виступає основним регулятором рівня прибутковості підприємства на висококонцентрованих ринках. Зростання ринкової частки фірми дає більшу ринкову силу та можливість підвищення цін та прибутковості. Ріст ціни через перехресну еластичність буде підвищувати попит на товари замінники та зменшувати попит на основний товар, у такий спосіб регулюючи ціну та прибутковість.

Отже, розуміння та аналіз різних індексів і критеріїв є критично важливим для ефективного управління в умовах сучасного конкурентного середовища.

Ключові слова: конкуренція, ринкова концентрація, ринкова влада підприємства, конкурентоспроможність, перехресна еластичність попиту.