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AN INTEGRATED MULTI-CRITERIA FRAMEWORK FOR ASSESSING ENTERPRISE COMPETITIVENESS

Abstract

The study proposes an integrated analytical framework for assessing the competitiveness of service enterprises based on multi-criteria evaluation, inflation-adjusted price analysis, and time-series forecasting. To account for price dynamics, inflation data for 2012–2025 were used to calculate cumulative inflation coefficients and reconstruct historical price trends. Competitiveness was assessed using an integral indicator that aggregates price and non-price factors, including pricing policy, range and quality of services, discount systems, frequency of visits, and brand image, enabling an objective comparison of enterprises. Revenue forecasting for 2026–2030 was performed using the ARIMA model, allowing the identification of medium-term development trends under changing market conditions. The results demonstrate that low pricing represents only a short-term competitive advantage, while sustainable market leadership is achieved through the balanced development of multiple competitiveness parameters. Unlike traditional descriptive competitiveness assessments, the proposed approach includes a formalized optimization component that identifies the combination of managerial parameters maximizing the enterprise competitiveness index under economic and operational constraints. The study's practical significance lies in developing a versatile competitiveness index, adaptable across industries, to guide strategic planning, optimize resources, strengthen market positions, and enhance investment attractiveness.

Keywords: competitiveness, competitive advantages, optimization model, competition, sector, management decision, integral competitiveness index.

Introduction

Competition is a multidimensional concept, in this study, it is treated as rivalry among firms for customers and market positions in a local service market. Because service firms compete not only through price but also through non-price attributes (service variety, quality, discounts, and brand image), competitiveness assessment requires an integrated and operational decision model.

Competitiveness is widely used in economic theory and refers to an entity's ability to outperform alternatives in meeting market needs under given constraints. In services, competitiveness is inherently multidimensional; therefore, this study operationalizes it through an integral index combining price and non-price factors [1, 2]. Competitiveness is relative and multidimensional, especially in services. Therefore, this paper uses an integral index combining price and non-price factors to support managerial decision-making [3]. At the present stage of economic development, competition serves as a key factor, prompting producers to constantly seek new ways to enhance their competitiveness. In this context, clarifying the economic essence of the concept of "enterprise competitiveness" is particularly important. This concept reflects a set of characteristics that determine the ability of an economic entity to operate successfully within a market economy [4]. In the academic literature, this concept is interpreted in a variety of ways. One view defines the competitiveness of an enterprise as its ability to withstand competition from other manufacturers of similar products, both in meeting public needs and in maintaining efficient production [5]. Competitiveness is likewise determined by the ability of the enterprise to market its products at a price that supports growth and the fulfillment of obligations to third parties [6]. Researchers examine the competitiveness of an enterprise from multiple perspectives – from comparative advantage and efficient resource use to the ability to adapt to changing market conditions and to ensure sustainable development [7]sustainable development is a development model aimed at a balance between economic growth, quality of life and environmental preservation in the medium and long term, without increasing consumption of natural resources beyond the capacity of the Earth. A distinctive feature of the European model of development is represented by the junction between the objective of increasing competitiveness and social and environmental objectives, which leads to deeper relationships between sustainable development and competitiveness. In this paper, we address the issue of competitiveness and sustainable development from two points of view: (1. These perspectives highlight the multidimensional and complex nature of this economic phenomenon.

Existing competitiveness assessment approaches are often product-oriented and provide limited guidance for service enterprises; service-sector methods are fewer and frequently lack universality. Since competitive advantages in services require continuous improvement, innovation, and a systematic approach to operations, an applied and transparent integral assessment model is needed to support managerial decisions [8]. Unlike existing studies that typically analyses pricing, competitiveness indices, or financial forecasting separately, the present research integrates these analytical dimensions within a unified decision-support framework for service enterprises.

Based on these principles, the immediate objective of any business entity in the service sector, under conditions of economic transformation, is both to achieve certain financial results in the market and to engage in competitive rivalry as the logical outcome of systematic and comprehensive efforts.

The study of the principal methods for assessing the competitiveness of an enterprise has shown that, in addition to their individual advantages and disadvantages, there are a number of common, fundamental problems and shortcomings in the practical evaluation of the competitiveness of a service enterprise. These issues accompany the approaches and methods under consideration to varying degrees:

1. The need to combine a large set of both uniform and heterogeneous indicators into a single indicator of the competitiveness of an enterprise.
2. The introduction of new concepts, definitions, and quantities as factors, based on complex and abstract constructs.
3. Comparison of enterprises engaged in similar activities and operating under the same economic conditions.
4. The number of factors considered when evaluating the competitiveness of an enterprise.
5. The assumption that the competitiveness of a specific service is identical to the competitiveness of the enterprise as a whole.

The shortcomings identified in the analysis of the methods for assessing the competitiveness of enterprises underscore the need for a comprehensive assessment of enterprise performance and guidance on their practical application in analytical work.

Therefore, the competitiveness of a service enterprise in the market serves as the primary criterion for assessing both the effectiveness of its operations and the performance of its management system.

Thus, within the framework of this study, we hypothesized that the development and implementation of optimization-based management models in the service sector can enhance firms' competitiveness by

accounting not only for pricing policies, but also for additional factors (such as government support, network expansion, and brand image). The central research hypothesis of the study is that a formally defined optimization model combining price and non-price competitiveness parameters can support more effective managerial decision-making than traditional descriptive competitiveness assessments. At the same time, a retrospective profitability analysis confirms that the sustainable development of private enterprises is possible only under a comprehensive approach to building competitive advantages.

Recent advances in multi-criteria optimization provide useful principles for decision modeling; however, many algorithms remain computationally demanding and are rarely validated on real-world firm-level datasets [9, 10]. In applied competitiveness assessment, model transparency, interpretability, and feasible data requirements are critical. Therefore, we propose a pragmatic multi-criteria management model that can be implemented with limited archival data and adapted through adjustable criteria weights [11, 12, 13].

The development of a competitiveness optimization model can enable more informed management, reduce costs, and improve resource utilization efficiency. It contributes to strengthening the market position of the entity, enhances its resistance to external changes, and increases its attractiveness to investors. Consequently, its application leads to higher profitability, productivity, and innovative development potential.

Materials and methods

Given the rapid development and improvement of the service sector, services are currently in high demand. This has led to the emergence of a large number of enterprises operating in this area. Daily, competition among service enterprises intensifies, and management has to continuously develop criteria for increasing competitiveness.

In general, the concept of “enterprise competitiveness” most often refers to the ability of an enterprise to produce a competitive product. However, given that enterprises today can produce different types of products and operate simultaneously in various product (industry) markets as part of a diversification strategy, at any given point in time, the level of the competitiveness of an enterprise does not necessarily coincide with the competitiveness of the products it produces. It should be noted that comparisons of enterprise competitiveness are primarily based on data from competing enterprises rather than the products they manufacture.

Competitiveness in this paper is operationalized at the firm level as the ability to sustain market position and financial performance under local competitive pressure [9].

The competitiveness of an enterprise is achieved through the introduction of innovative equipment and technologies (providing environmental, social, and economic effects), the most efficient use of the enterprise’s reserves, and attaining a high level of investment attractiveness. Together, these factors ensure the manufacture of competitive products [9].

To determine the methods and ways to increase the competitiveness of a particular company, it is first necessary to analyze and assess its competitiveness, identifying its internal strengths and weaknesses. These are the key components that must be considered before developing a further competitive strategy. Only with knowledge of the market situation and its own level of competitiveness can an enterprise make informed decisions regarding its future development strategy.

The competitiveness of a service enterprise can be evaluated using various methods: an integral indicator based on several individual measures of the effective use of labor, material, intangible, and financial resources; comparison of competitiveness indicators of specific services offered by the organization in a given market; comparison of the ratios of the competitiveness of the organization’s services and its market share; a methodology for assessing the competitiveness of an organization taking into account the effectiveness of an innovative project; an express assessment of the competitiveness of an organization; a methodology for analyzing the competitiveness of an organization according to individual elements of the marketing mix, and others.

Evaluation and analysis of prices. Price dynamics in the service sector is one of the key indicators of competitiveness and the development of local markets. According to the theory of market pricing, service costs are influenced by a combination of factors: supply and demand levels, inflation, seasonality, and the characteristics of the competitive environment. To analyze trends, both current and

retrospective data are required to identify patterns of price changes over time and conduct comparative studies.

As part of this study, information was collected on the cost of services at bath complexes in Ust-Kamenogorsk (East Kazakhstan region, Republic of Kazakhstan) for various years, including 2015, 2018, 2020, and other periods. Specialized online catalogs and services such as 101sauna.kz [14], oskemen.bani.kz [15], and 2GIS [16] were used.

The analysis revealed that these sources primarily provide current data, while data on past prices are generally lacking. As of November 2023, the cost of renting bath complexes ranged from 2,500 to 12,000 tg per hour. This highlights a methodological issue: the scarcity of sources for retrospective analysis. The absence of archival data complicates the identification of long-term price trends and limits the ability to make well-grounded forecasts.

In addition to the analysis of online catalogs, a search for information was conducted in user reviews on the platforms under study. Nevertheless, no price data with corresponding dates were found. For example, the 101sauna.kz website does include customer reviews, but they do not provide specific references to service costs for different years. A similar situation is observed on the 2GIS platform: for individual bath complexes, such as “Berloga”, only current prices are listed (6,000–9,000 tg per hour), without archival data on prices.

Due to the absence of direct archival data on service prices, an alternative approach was employed – the use of the Consumer Price Index (CPI) of the Republic of Kazakhstan. This method allows for estimating price dynamics based on official inflation indicators, enabling an approximate reconstruction of past price levels. Past inflation data were obtained from open statistical sources, including the Statista platform [17] which provides annual inflation rates from 2012 to 2025, as shown in the figure 1.

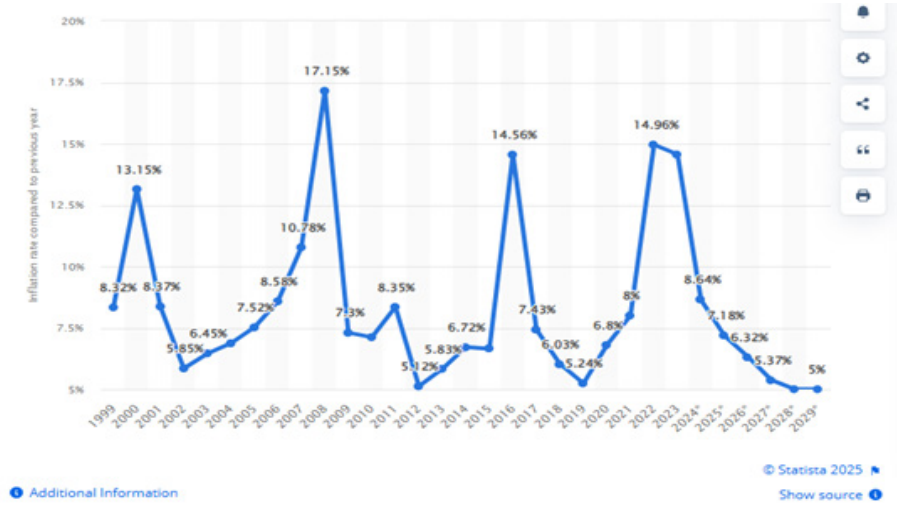


Figure 1 – Inflation rate in Kazakhstan from 1999 to 2029

Note: Compiled by the authors based on official consumer price index (CPI) data for the Republic of Kazakhstan for 2012–2025 and open statistical sources [17].

Therefore, using the CPI serves as a compensatory tool in the absence of direct price data, allowing for retrospective analysis while accounting for macroeconomic factors that influence service pricing.

The table 1 presents annual inflation rates in Kazakhstan for the period 2012–2025, as well as the calculated cumulative factors, with 2012 taken as the base year:

The cumulative multiplier is calculated as the product of (1 + inflation rate) for each year from 2012 to the target year. For example, for 2025, a multiplier of 2.9268 means that prices in 2025 are, on average, 2.93 times higher than in 2012.

Accordingly, using cumulative multipliers based on the CPI allows for extrapolating approximate price values for past periods, which is especially important for analyzing competitiveness and assessing trends in the services market.

Table 1 – Inflation Rates and Cumulative Factors in Kazakhstan (2012–2025)

Year	Inflation rate (%)	Cumulative factor
2012	0	1.0000
2013	5.83	1.0583
2014	6.72	1.1294
2015	6.65	1.2045
2016	14.56	1.3800
2017	7.43	1.4825
2018	6.03	1.5718
2019	5.24	1.6542
2020	6.8	1.7667
2021	8	1.9080
2022	14.96	2.1937
2023	14.56	2.5132
2024	8.64	2.7310
2025	7.18	2.9268
Note: Compiled by the authors based on official consumer price index (CPI) data for the Republic of Kazakhstan for 2012–2025, using cumulative inflation factors (base year – 2012).		

Figure 2 illustrates the evolution of nominal and real prices for the three enterprises. The upper panel presents unadjusted nominal prices, while the lower panel shows inflation-adjusted values based on 2012 as the base year. This comparison highlights differences between overall market trends and the pricing strategies of individual enterprises.

Figure 2. Pricing dynamics for Enterprises A, B, and C, showing nominal and real prices adjusted for inflation (base year 2012).

The dashed black line indicates the average market price. The vertical red line marks the closure of enterprise A, and the gray line marks the start of the forecast period.

Instrumental approach. Data processing, index construction, and forecasting were implemented in Python using standard data analysis and econometric libraries. The computational workflow is fully reproducible and can be reused for other service enterprises with minor adjustments.

For time series analysis and forecasting, the Statsmodels library is used, particularly the ARIMA (AutoRegressive Integrated Moving Average) model. The theoretical foundation of ARIMA is based on the work of Box and Jenkins, who demonstrated its effectiveness for time series of various types. ARIMA takes into account both trend and seasonal components, making it especially valuable in socio-economic forecasting tasks.

ARIMA was selected because the available annual series is relatively short (2012–2025) and requires an interpretable benchmark forecasting approach. Model specification followed the Box–Jenkins logic, using information criteria (AIC/BIC) and residual diagnostics to confirm adequacy. Forecasts for 2026–2030 are reported with uncertainty bounds to support risk-aware managerial planning [18].

Model adequacy was checked using standard stationarity and residual diagnostics and information criteria. Out-of-sample performance was evaluated using a rolling forecasting scheme [19].

Methodology and Mathematical Approach.

The optimization model employed in this study is a multicriteria system for assessing competitiveness (MCDM – Multi-Criteria Decision Making) with elements of time-series forecasting. It is based on aggregating both price and non-price factors into an integral indicator that incorporates the following weights: price (25%), range and quality of services (23%), consumption frequency (20%), corporate image (22%), and discount system (10%).

The weights of the criteria were determined using the Analytic Hierarchy Process (AHP). A structured pairwise comparison procedure was conducted involving experts from the service sector, including managers of bath complexes, marketing specialists, and academic researchers. The AHP

method allowed the transformation of qualitative judgments into quantitative weights reflecting the relative importance of each competitiveness factor.

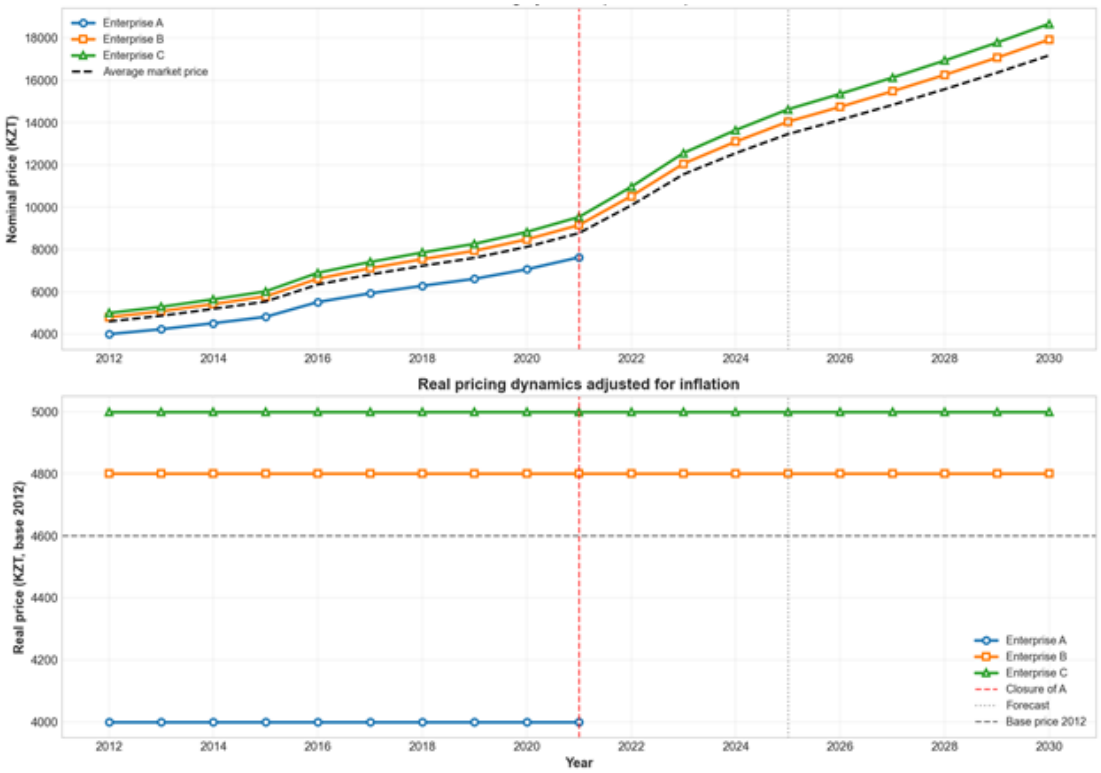


Figure 2 – Nominal and inflation-adjusted prices for Enterprises A, B, and C (base year 2012)

Note: Compiled by the authors using CPI data (2012–2025) and cumulative inflation multipliers to estimate bath service prices in Ust-Kamenogorsk.

The model includes dedicated mechanisms for price optimization via a threshold scoring function relative to the average market price, inflation adjustment based on actual data for Kazakhstan for the period 2012–2025, adaptation to the crisis periods of 2014–2016 and 2020–2022, as well as revenue forecasting for enterprises for 2026–2030 using an ARIMA(1,1,1) specification. The general procedure for applying the model, taking into account these individual mechanisms, consists of several steps described below.

Sensitivity analysis was conducted to evaluate the robustness of the competitiveness index with respect to variations in criteria weights. Each weight was varied within a ±10% interval, while maintaining the normalization condition that the sum of weights equals one. The results demonstrated that the ranking of enterprises remained stable across the tested weight variations, indicating that the competitiveness index is not overly sensitive to moderate changes in expert-defined weights. This confirms the robustness of the proposed evaluation framework.

Data Preparation. The initial 2012 price values for three enterprises were adjusted using inflation indicators to account for changes in the purchasing power of the national currency. For the calculation, a cumulative inflation multiplier was applied, defined by the recurrence relation:

$$M_t = M_{t-1} * (1 + r_t) \quad (1)$$

where

M_t is the multiplier for year t,

r_t is the inflation rate for the corresponding period.

This approach is consistent with the theoretical principles of macroeconomics, which hold that long-term price changes can be accurately described by the sequential accumulation of annual inflation

rates. Using this methodology allows us to render the data comparable and thereby ensure the validity of the subsequent competitiveness analysis, in line with the standards of econometric research and empirical pricing models.

Competitiveness Assessment. The second stage of the study involved assessing the competitiveness of the enterprises using an integral indicator expressed as a weighted sum of parameters. To move beyond descriptive competitiveness evaluation, the study introduces a formal optimization problem aimed at identifying managerial strategies that maximize the enterprise competitiveness index. Competitiveness was calculated according to the following formula:

$$= 0.25 * P_{price} + 0.23 * P_{services} + 0.2 * P_{frequency} + 0.1 * P_{discounts} + 0.22 * P_{image} \quad (2)$$

where P_i denotes the score for the corresponding parameter.

Figure 3 presents the competitiveness index over the study period. Enterprise A remains stable until its closure in 2021, while Enterprise B demonstrates a gradual increase, partially driven by strategic adjustments implemented in 2025. The lower panel quantifies the direct effect of these adjustments on the index.

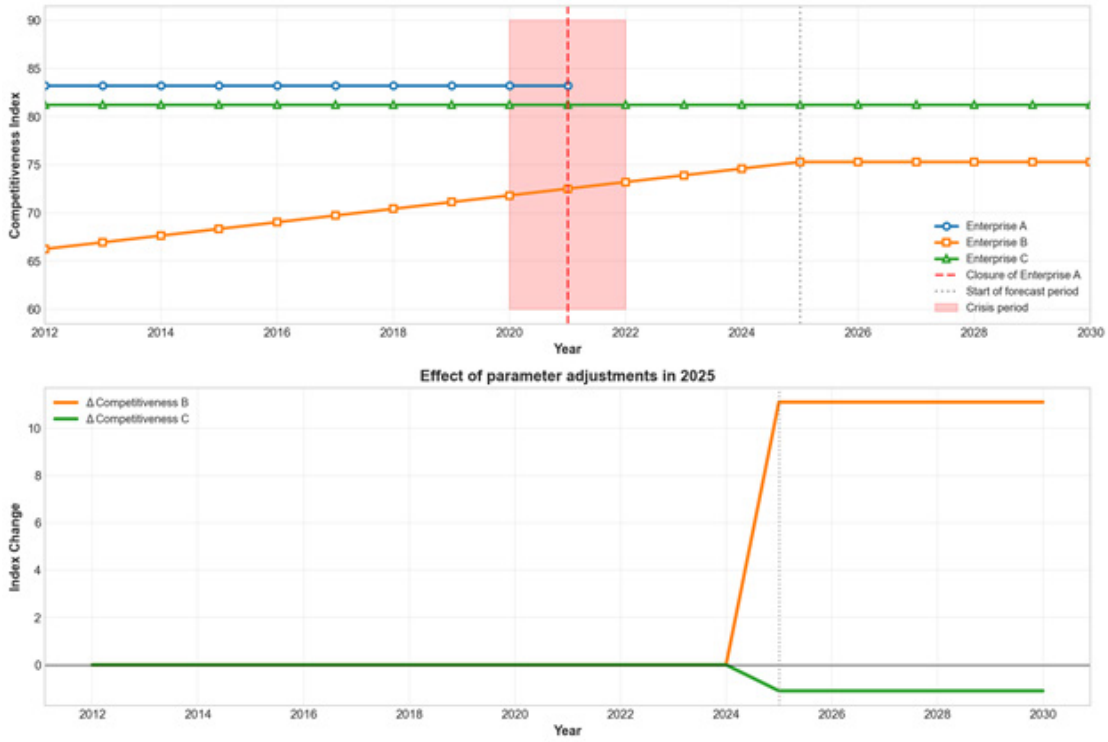


Figure 3 – Composite competitiveness index based on five weighted criteria
(Price 0.25, Service Types 0.23, Frequency 0.20, Discounts 0.10, Brand Image 0.22)

Note: Compiled by the authors based on a weighted scoring methodology using five criteria: price, service types, frequency, discounts, and brand image.

The top panel shows the index dynamics over time, while the bottom panel reflects the effect of parameter adjustments in 2025 (Δ values).

The approach aligns with the theoretical principles of multifactorial competitiveness analysis, which involves aggregating both price and non-price characteristics of an enterprise into a single index. For the price parameter, a threshold-based scoring system was applied relative to the average market value, whereby maximum points were assigned to enterprises with prices significantly below the market price (≤79% of the average price), and scores decreased as this threshold was approached or exceeded:

$$Score_{price} = \begin{cases} 100 \\ P_{price} \leq 79\% * Avg_{price} \ 75, \\ P_{price} \leq 90\% * Avg_{price} \ 50, \\ P_{price} \leq 105\% * Avg_{price} \ 25, \\ P_{price} \leq 120\% * Avg_{price} \ 10, \\ P_{price} \leq 125\% * Avg_{price} \ 0, \end{cases} \quad (3)$$

This optimization framework allows management to identify feasible strategic combinations of price policy, service improvements, and marketing measures that maximize competitiveness while maintaining financial stability.

The economic rationale behind the model is that it enables service-sector enterprises to find an optimal balance between price competitiveness and qualitative performance characteristics, to take into account macroeconomic factors and crisis scenarios, and to develop long-term forecasts that can be used for strategic planning and enhancing resilience.

Time Series Modeling. The third stage of the study involved time-series modeling to forecast the dynamics of enterprise income for the period 2026–2030. To address this task, the ARIMA(1,1,1) model was utilized, which is recognized as one of the most widely used tools for analyzing and predicting economic indicators. Its formal representation is:

$$X_t = \mathrm{c} + \phi X_{t-1} + \theta \epsilon_{t-1} + \epsilon_t \quad (4)$$

where

X_t denotes the current income value,

c, ϕ, θ are the model parameters, and ϵ_t is the random error term.

The theoretical foundation of the ARIMA model follows the Box-Jenkins methodology, which applies autoregression, integration, and moving averages to describe time-series dynamics. This model captures both trend components and random fluctuations, making it particularly effective for forecasting income under changing market conditions. Hence, an ARIMA-based forecast provides a scientifically grounded view of potential development scenarios for enterprises and forms a basis for management decisions aimed at strengthening their competitiveness.

The graph (Figure 4) shows the dynamics of sales profitability from 2012 to 2030, including the closure of Enterprise A in 2020 and the forecast period starting in 2025. Enterprise C consistently maintains higher profitability within the optimal control range, whereas Enterprise B remains stable within the acceptable zone but below the optimal level. The shaded control areas (green for optimal and yellow for acceptable) help visualize the financial performance relative to industry benchmarks and highlight the overall stability of the enterprises' profitability.

Figure 5 illustrates the historical dynamics of revenues for Enterprises A, B, and C, highlighting the impact of crisis periods on performance. During 2020–2022, all enterprises experienced a pronounced decline: Enterprise A ceased operations in 2020, while Enterprises B and C subsequently demonstrated partial recovery. The ARIMA-based forecast produces flat trajectories for the period after 2025, reflecting the model's built-in assumption of stability in the absence of strong recent upward or downward trends. This forecast underscores that, although some recovery has been achieved, future revenue levels are expected to stabilize below pre-crisis peaks, emphasizing the long-term consequences of the downturn.

Figure 6 presents radar charts illustrating the comparative competitiveness profiles of the three enterprises over time, between 2021 and 2025, across five key criteria: price, service range, service frequency, discounts, and brand image. The top-left chart shows the position of the enterprises in 2021. During this period, Enterprise A dominates in terms of price and discounts, with substantially higher values on these indicators compared to its competitors. At the same time, Enterprise C is the leader in brand image and service variety, forming the most balanced profile, close to the ideal across most dimensions. Enterprise B occupies an intermediate position, lagging behind its competitors on several criteria.

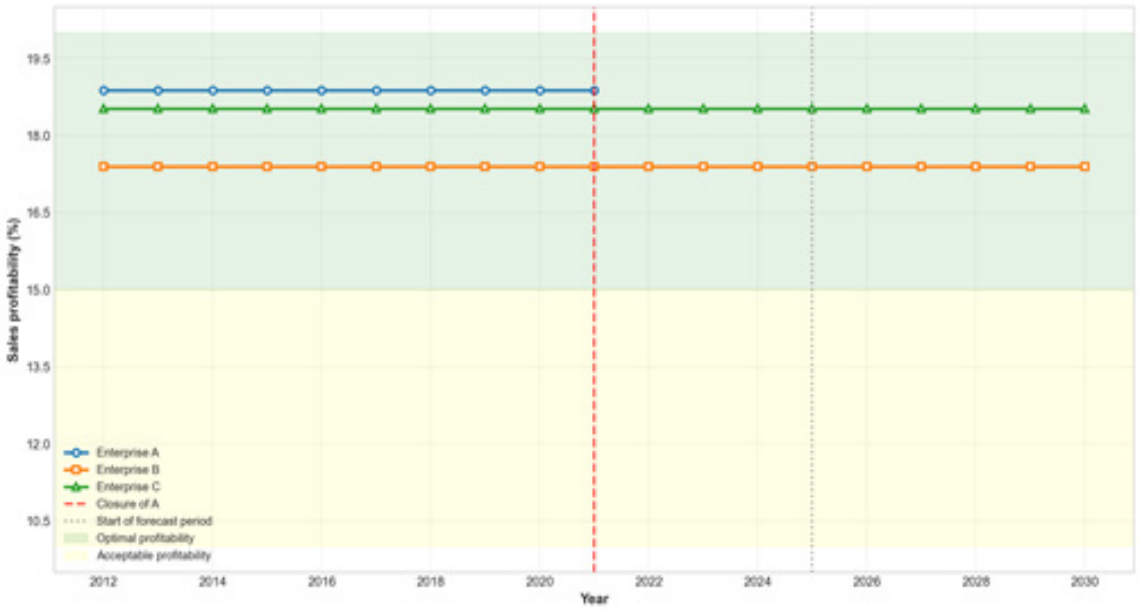


Figure 4 – Sales profitability trends for Enterprises A, B, and C,
polynomial trend lines for active enterprises. Shaded areas indicate optimal (green)
and acceptable (yellow) benchmark levels of profitability

Note: Compiled by the authors based on enterprise financial performance data; polynomial trend lines are fitted for active enterprises, and shaded areas represent benchmark profitability ranges (optimal and acceptable levels).

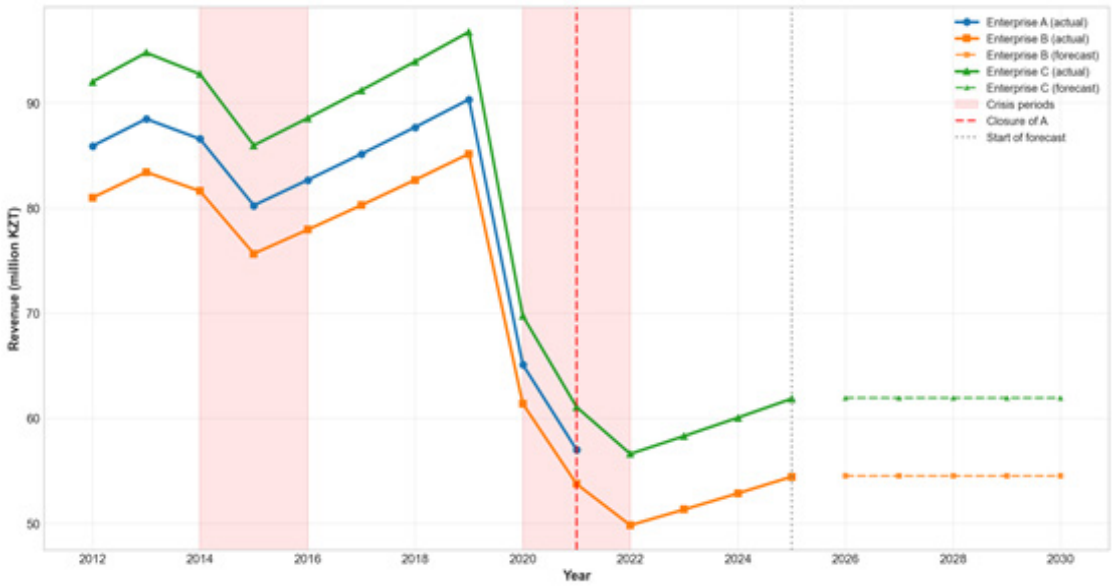


Figure 5 – Revenue trends from 2012 to 2025, with ARIMA(1,1,1) forecast for 2026–2030.
Solid lines indicate historical data, dashed lines represent forecasted values,
and shaded regions highlight crisis periods

Note: Compiled by the authors based on enterprise revenue data; forecasts for 2026–2030 are generated using an ARIMA(1,1,1) model, where solid lines represent historical values, dashed lines indicate projected trends, and shaded regions denote crisis periods.

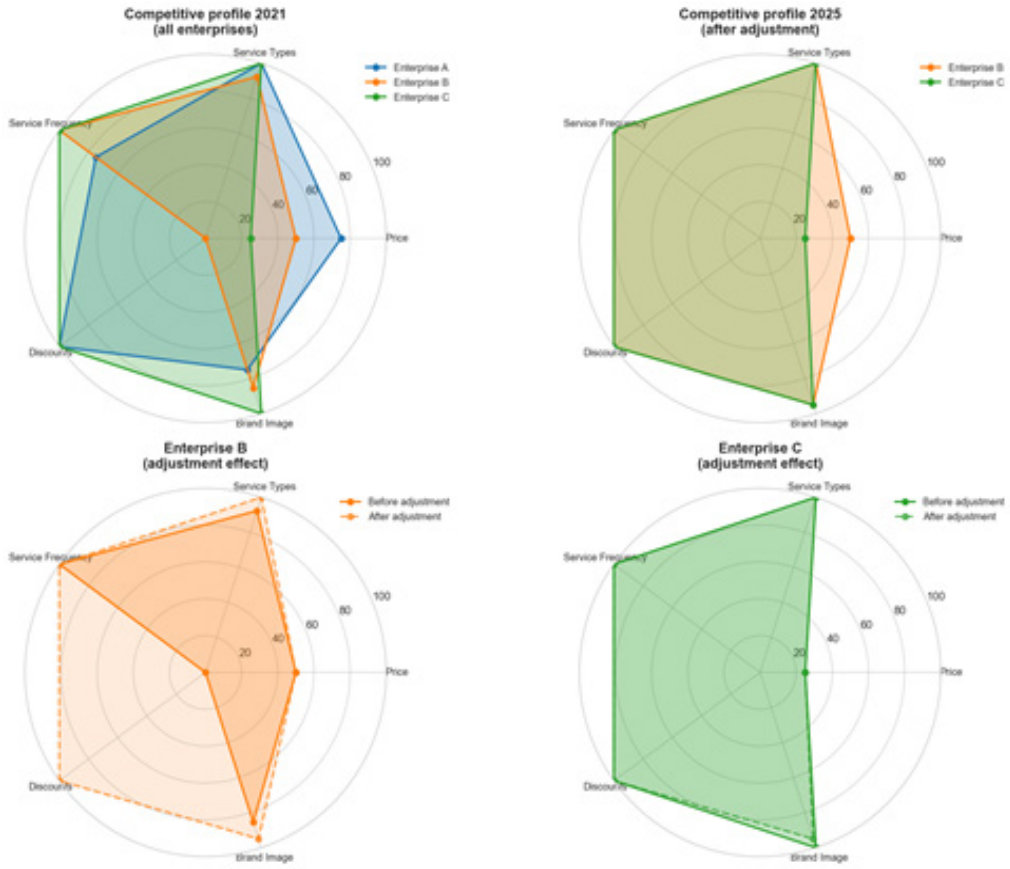


Figure 6 – Radar charts of competitiveness factors. Top-left: 2021 profiles for all enterprises. Top-right: 2025 profiles after adjustments. Bottom panels: before-and-after adjustment comparisons for Enterprises B (left) and C (right)

Note: Compiled by the authors based on the evaluation of competitiveness factors; radar charts illustrate enterprise profiles before (2021) and after (2025) adjustments, as well as comparative changes for Enterprises B and C.

The top-right chart shows the situation in 2025 after the implementation of adjustments and strategic changes. It is evident that Enterprise B has significantly improved its discount and brand image indicators, narrowing the gap with Enterprise C. Enterprise C still maintains its leadership in service range and service frequency and continues to show high values for brand image.

The bottom charts display the profile changes for Enterprise B (left) and Enterprise C (right) before and after the implemented adjustments: dashed lines indicate values before the changes, and solid lines represent values after. Enterprise B exhibits a noticeable improvement across most parameters, especially in discounts and brand image. Enterprise C also shows gains; however, its initial positions were already closer to leading levels on most criteria.

Results

The competitiveness polygon method allows for clear visualization of indicator distributions across key parameters, resulting in a holistic understanding of enterprises' strengths and weaknesses. Its advantage is the ability to perform a comprehensive analysis in a variety of areas. However, as the number of parameters increases, the diagram's readability decreases, necessitating scaling to maintain clarity. To represent a large number of indicators on the polygon axes, the diagram must be enlarged; otherwise, marks and lines will merge into a uniform mass, impairing visual perception.

Figure 7 depicts the comparative positions of enterprises B and C in 2025. The top panels illustrate competitive strength and profitability levels, while the bottom panels highlight the underlying factors contributing to these outcomes and their impact on financial performance.

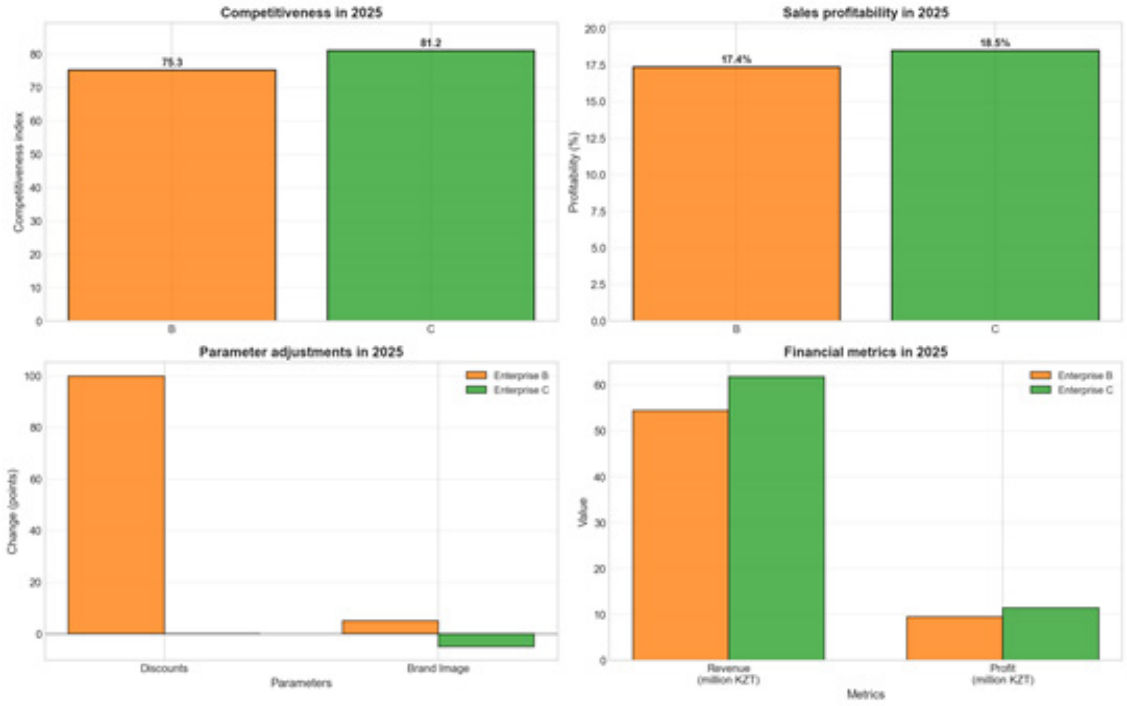


Figure 7 – Top panels: competitiveness index and sales profitability in 2025. Bottom left: changes in key parameters (discounts, brand image). Bottom right: revenue and profit comparison

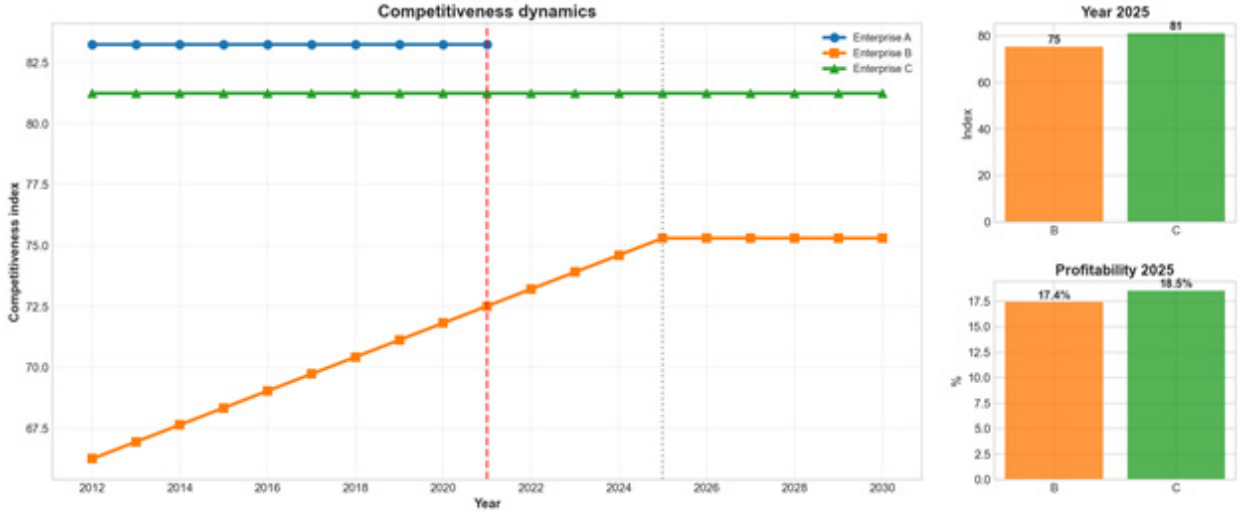
Note: Compiled by the authors based on enterprise performance and competitiveness data; the figure presents competitiveness index and sales profitability for 2025, changes in key parameters (discounts and brand image), and a comparison of revenue and profit.

Figure 8 serves as an executive summary, integrating the main findings into a single visual. It is useful for stakeholders who require a high-level overview of trends and outcomes. Figure 8 – Comprehensive dashboard summarizing competitiveness dynamics, key 2025 indicators, and benchmark comparisons. In retrospect, Enterprise C ("Bulgarskie Bani") was clearly the market leader in 2012, with high competitiveness parameters despite the highest price. Enterprise A (LLP "Ellada") drew customers with a low price (4,000 tenge) and seasonal services, but it was unable to withstand competitive pressure and ceased operations in 2021. Enterprise B ("Orlovskie Bani") held an intermediate position in 2012. However, by 2025, it had risen to the top of the market as a result of targeted improvements such as discount implementation and positive image building.

Long-term sustainability is not guaranteed unless service quality and a positive image are maintained. The best results are obtained through balanced development across all competitiveness parameters, as dominance in a single category does not guarantee leadership. The company's image and customer loyalty are especially important, having a long-term impact on market positions. Furthermore, the ability to adapt to changes, offer discounts, broaden the range of services, and improve service quality is what drives the greatest increase in competitiveness. Competitiveness is inherently dynamic, and market leadership can shift as a result of managerial decisions, external economic conditions, and consumer preferences.

Limitations of the Study. Despite the analytical contributions of the study, several limitations should be acknowledged. The empirical analysis is based on a local service market, which may limit the generalizability of the findings to other geographical contexts.

The time series used for revenue forecasting is relatively short (2012–2025), which restricts the predictive accuracy of econometric models. For this reason, the ARIMA model is used primarily as a baseline forecasting approach rather than a high-precision predictive tool. ARIMA forecasts on short time series can be sensitive to structural shifts, crisis periods, or abrupt market changes; therefore, the results should be regarded as indicative development scenarios rather than precise predictions.



Enterprise	Price	Revenue	Sales profitability	Competitiveness
Enterprise B	14,044 KZT	54.5 million KZT	17.4%	75.3
Enterprise C	14,630 KZT	61.9 million KZT	18.5%	81.2

Key indicators for 2025

Figure 8 – Dashboard summarizing enterprise competitiveness and market positions in 2025

Note: Compiled by the authors based on integrated enterprise performance and competitiveness indicators; the dashboard summarizes market positions and competitiveness levels of enterprises in 2025.

The weights of the competitiveness criteria are derived from expert evaluation, which introduces a degree of subjectivity despite the use of the structured AHP methodology.

The competitiveness model incorporates five key criteria; however, other potentially important factors, such as location accessibility, online reputation, customer satisfaction metrics, and digital marketing presence, were not included due to data limitations. The model assumes constant weights of competitiveness criteria over time, whereas in real markets the relative importance of factors such as price, service quality, or brand image may change depending on economic conditions and consumer preferences.

Future research may expand the dataset, incorporate additional enterprises, and explore alternative forecasting models such as machine learning methods or hybrid econometric approaches.

Discussion

Within the framework of this study, it was hypothesized that optimization models can enhance the competitiveness of service-sector enterprises. The model under consideration supports this assumption, as it aggregates price and non-price factors into a single integral indicator that enables an objective comparison of enterprises.

The price thresholds embedded in the model make it possible to analyze the feasibility of a given pricing strategy, which is directly related to the profitability of opening and the long-term operation of private enterprises. At the same time, the multifactor nature of the model ensures that not only pricing policy is taken into account, but also other key parameters of sustainability, such as service quality, corporate image, network expansion, and government support.

The model is adaptable across industries by redefining the criteria set and recalibrating weights to reflect sector-specific drivers. Implementation involves (i) selecting criteria, (ii) collecting at least 3–5 years of data, (iii) eliciting weights (expert scoring/AHP), and (iv) choosing a suitable forecasting model for the revenue component. In this study, the criteria set is tailored to local service enterprises, emphasizing price, service range/quality, customer frequency, discounts, and brand image.

Thus, the model can serve as a universal tool for various industries, providing a comprehensive assessment of competitiveness, accounting for macroeconomic factors, and constructing forecast development scenarios.

Conclusion

The development of an optimization model for enhancing competitiveness offers significant advantages for management practice. It enables decisions to be made based on objective criteria and data, increasing management efficiency and reducing reliance on subjective factors. The model helps lower costs through rational resource allocation and the elimination of inefficiencies, while also improving market stability by allowing the entity to adapt more rapidly to changes in the external environment and intensifying competitive pressure. The general methodology based on this model is universal and can be adapted by enterprises to their specific conditions, using it for comparative analysis, assessment of strengths and weaknesses, and the development of managerial decisions aimed at strengthening market positions and increasing investment attractiveness. Consequently, competitive positions are strengthened, and the ability to attract customers, maintain market share, and expand into new segments is enhanced. An additional benefit is increased investment attractiveness, as the presence of a scientifically grounded management model fosters trust among investors and partners. The model also functions as a strategic planning tool, supporting the development of long-term programs and mitigating risks by enabling early identification of threats and simulation of response scenarios. Altogether, these advantages contribute to improved economic outcomes, including higher profitability, productivity, and innovative potential of the research object.

The results of the study confirm that the use of optimization models overcomes the limitations of traditional approaches based on intuition or simple comparative assessments. The application of modern multi-criteria optimization methods allows for comprehensive and dynamic management of competitiveness, accounting for both quantitative and qualitative factors. This opens avenues for further research on adapting such models to diverse industries and contexts, as well as their integration into decision support systems.

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КӘСІПОРЫННЫҢ БӘСЕКЕЛЕСТІК ОРТАСЫН БАҒАЛАУДАҒЫ НЕГІЗГІ ШЕШІМ РЕТІНДЕ БАСҚАРУДЫҢ ОҢТАЙЛАНДЫРУ МОДЕЛІ

Аңдатпа

Зерттеу кәсіпорындардың бәсекеге қабілеттілігін талдауды ұсынады, көп критерийлі оңтайландыру әдістерін және экономикалық-математикалық модельдеуді пайдалана отырып. Баға динамикасын ескеру үшін 2012–2025 жж. инфляция деректері кумулятивті инфляция коэффициенттерін есептеу және тарихи баға трендтерін қалпына келтіру үшін пайдаланылды. Бәсекеге қабілеттілік баға және бағасыз факторларды агрегациялайтын интегралдық көрсеткіш арқылы бағаланды, оның ішінде баға саясаты, қызметтердің ассортименті мен сапасы, жеңілдік жүйелері, келу жиілігі және бренд имиджі, бұл кәсіпорындарды объективті салыстыруға мүмкіндік береді. 2026–2030 жж. кіріс болжамдауы ARIMA моделі арқылы жүргізілді, ол өзгеретін нарықтық жағдайларда орта мерзімді даму трендтерін анықтауға мүмкіндік береді. Нәтижелер төмен бағалардың тек қысқа мерзімді бәсекелестік артықшылық береді екенін көрсетеді, ал тұрақты нарықтық лидерлік көптеген бәсекеге қабілеттілік параметрлерінің теңгерімді дамуы арқылы қол жеткізіледі. Ұсынылған оңтайландыру моделі баға шекараларын қамтиды, ол баға стратегияларының ұзақ мерзімді пайдалылық және операциялық тұрақтылыққа қатысты орындылығын бағалауға мүмкіндік береді. Зерттеудің практикалық маңызы кәсіпорындардың күшті және әлсіз жақтарын анықтау және стратегиялық жоспарлауда қолдануға болатын интегралдық бәсекеге қабілеттілік индексін құруда жатыр. Модель әмбебап және критерийлер жиынтығын және

олардың салмақтарын реттеу арқылы әртүрлі салаларға бейімделе алады, осылайша ресурстарды тиімді пайдалануды, нарықтық позицияларды нығайтуды және инвестициялық тартымдылықты арттыруды қолдайды.

Тірек сөздер: бәсекеге қабілеттілік, бәсекелестік артықшылықтар, оңтайландыру моделі, бәсеке, қызмет көрсету саласы, басқару шешімі, интегралдық бәсекеге қабілеттілік индексі.

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ОПТИМИЗАЦИОННАЯ МОДЕЛЬ УПРАВЛЕНИЯ КАК ФУНДАМЕНТАЛЬНОЕ РЕШЕНИЕ В ОЦЕНКЕ КОНКУРЕНТНОЙ СРЕДЫ ПРЕДПРИЯТИЯ

Аннотация

Исследование представляет анализ конкурентоспособности предприятий с использованием методов многокритериальной оптимизации и экономико-математического моделирования. Для учета динамики цен были использованы данные по инфляции за 2012–2025 гг. для расчета кумулятивных коэффициентов инфляции и реконструкции исторических ценовых трендов. Конкурентоспособность оценивалась с помощью интегрального показателя, агрегирующего ценовые и неценовые факторы, включая ценовую политику, ассортимент и качество услуг, системы скидок, частоту посещений и имидж бренда, что обеспечивает объективное сравнение предприятий. Прогнозирование доходов на 2026–2030 гг. проводилось с использованием модели ARIMA, позволяющей выявить среднесрочные тенденции развития в условиях изменяющейся рыночной среды. Результаты демонстрируют, что низкие цены обеспечивают лишь краткосрочное конкурентное преимущество, в то время как устойчивое лидерство на рынке достигается за счет сбалансированного развития множества параметров конкурентоспособности. Предлагаемая модель оптимизации включает пороговые значения цен, позволяющие оценивать целесообразность ценовых стратегий с точки зрения долгосрочной прибыльности и операционной устойчивости. Практическая значимость исследования заключается в построении интегрального индекса конкурентоспособности, который может применяться в стратегическом планировании для выявления сильных и слабых сторон предприятий. Модель универсальна и может адаптироваться к различным отраслям путем корректировки набора критериев и их весов, способствуя эффективному использованию ресурсов, укреплению рыночных позиций и повышению инвестиционной привлекательности.

Ключевые слова: конкурентоспособность, конкурентные преимущества, модель оптимизации, конкуренция, сфера услуг, управленческое решение, интегральный индекс конкурентоспособности.

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