3. Ніколаєнко С. М. Якість вищої освіти – запорука конкурентоспроможності українських університетів. Вісник Національної академії педагогічних наук України. 2020. № 2. Ч. 2. С. 1–7.
4. Лєснікова М.В. Порівняльний аналіз освітньої статистики у сфері фахової передвищої освіти країн Європейського Союзу та України. Наукове фахове видання "Освітня аналітика України". 2025.№ 3 (35). URL: https://science.iea.gov.ua/wp-content/uploads/2025/11/6_Lyesnikova_335_2025_82-93.pdf
5. Лопушняк Г.С., Рибчанська Х.В. Вища освіта України: державне регулювання та перспективи розвитку: монографія. Львів, 2018. 283 с.
6. Лопушняк Г.С. Економічні, правові, інформаційні та гуманітарні проблеми розвитку України в постстабілізаційний період. Матеріали наукової конференції професорсько-викладацького складу (Тернопіль, 16 квітня 2008 р.). Тернопіль, 2008. С 78-80.
7. Скидан, М. І. Підвищення якості освітніх послуг як основний стратегічний напрям розвитку вищої та фахової передвищої освіти. Економіка та суспільство. 2024. № 59. URL: https://doi.org/10.32782/2524-0072/2024-59- 110
8. Скидан М., Лопушняк Г., Кравчук, О., Ільченко-Сюйва Л. Стратегічний аналіз розвитку закладів вищої освіти в Україні в умовах сучасних викликів: інтегрований підхід. Transylvanian Review Of Administrative Sciences, 21(76), 146-175. URL: https://doi.org/10.24193/tras.76E.9
9. Колот А. М., Герасименко О. О. Праця XXI: філософія змін, виклики, вектори розвитку: монографія. Київ: КНЕУ імені Вадима Гетьмана, 2021. 487 с. URL: https://ir.kneu.edu.ua/bitstream/handle/2010/36870/Pfzvvr_2021.pdf?sequence=3&isAllowed=y
10. Колот А. М. Вища освіта і соціально-трудова сфера в координатах нової економіки: концепт взаємодії та розвитку. Соціально-трудові відносини: теорія та практика. 2025. Вип. 15 (1). С. 19. URL: https://www.businessperspectives.org/images/pdf/applications/publishing/templates/article/assets/22152/SLRTP_2025_01_Kolot.pdf

DOI 10.70286/ISU-21.01.2026.006

OPTIMIZATION OF USED CAR PRICING AI-BASED ONLINE AUCTION PLATFORMS

Ishchenko Vladyslav
Bachelor, Owner (Founder)
ORCID: https://orcid.org/0009-0008-6816-8308
Auto Planet, LLC, 753 N US Hwy 17–92, Ste D-108, Longwood, FL 32750, USA

Introduction. The development of digital technologies and the active integration of artificial intelligence are significantly transforming the mechanisms of the used car market, particularly within online auctions, where price formation often remains opaque and dependent on subjective factors. The growth of online sales volumes, price volatility, information asymmetry between sellers and buyers, and the need for fair and economically justified vehicle valuation highlight the necessity for deeper scientific analysis of the capabilities of AI-based platforms. Research in this area makes it possible to assess how intelligent algorithms can improve price prediction accuracy, reduce the risk of manipulation, and enhance trust and operational efficiency in online auctions within the used car segment.

Purpose of the Study. The purpose of this study was to substantiate and analyze the potential for optimizing used car pricing through the application of AI-based online auction platforms.

Literature Review. The study by Araf et al. (2025) examined the application of artificial intelligence in price formation across various business sectors, with particular attention to improving transparency and the economic justification of pricing. The authors emphasized the importance of considering consumer needs and policy decisions to achieve stability in pricing strategies on online platforms. In particular, Rafsan et al. (2025) presented the CarKoto platform, which employs AI algorithms to accurately predict used car prices in Bangladesh. The findings demonstrated that the use of intelligent models reduces discrepancies between actual and predicted prices and increases user trust in auction platforms. For example, Mullapudi (2025) conducted a comparative analysis of pricing optimization methods across different industries, including the automotive market. The study showed that integrating machine learning with analytical approaches enhances the accuracy and efficiency of price setting. In addition, Zhang et al. (2024) explored the application of multi-agent deep reinforcement learning algorithms for optimizing prices at electric vehicle charging stations. The author demonstrated that such approaches can be adapted for online auctions, where forecasting price dynamics and stimulating buyer participation are essential.

The study by Hota (2024) described dynamic and transaction-based pricing strategies in the automotive and financial sectors, emphasizing the flexibility of algorithmic approaches. It was found that integrating such strategies with artificial intelligence enables rapid responses to market fluctuations and reduces losses in used car sales. In particular, Sarkar et al. (2023) proposed a comprehensive machine learning model for dynamic pricing in e-commerce, including the prediction of online purchasing behavior. The authors demonstrated that similar approaches can be effectively applied to the automated pricing of used cars in online auction environments. For example, Selvakanmani et al. (2024) investigated automated forecasting of vehicle residual values using AI algorithms. The study confirmed that machine learning enables more accurate valuation of used cars and improves the efficiency of trading on online auction platforms. In addition, Najeetha Banu et al. (2025) examined the integration of machine learning and auction mechanisms to optimize dynamic pricing of advertising and bidding processes. The authors noted that such methods can be transferred to the automotive market to enhance the accuracy and transparency of price offers. In the study by Chen et al. (2024), a reverse double auction mechanism was proposed to improve the efficiency of operations on e-commerce platforms. The findings showed that the application of such algorithms can reduce information asymmetry and ensure optimal pricing for both buyers and sellers. Furthermore, Gong (2024) developed an approach to optimizing supply chain management in international e-commerce based on fuzzy logic and auction theory. The author demonstrated that algorithmic modeling and intelligent pricing strategies can enhance the efficiency of online auctions in the used car segment.

The study employed the following materials and methods: analysis to examine scientific publications and practical applications of artificial intelligence in used car pricing; synthesis to integrate theoretical concepts into a coherent framework for price optimization on online auctions; comparison to contrast traditional and AI-driven pricing approaches; and generalization to formulate conclusions and recommendations aimed at improving pricing efficiency.

Results. Optimizing used car pricing through AI-based online auction platforms represents a modern direction of digital transformation in the automotive market, combining the capabilities of artificial intelligence and online commerce to improve sales efficiency and the accuracy of vehicle valuation. Used cars account for a significant share of the automotive market, and one of the key challenges for both sellers and buyers has consistently been the determination of a fair price. Traditional pricing methods typically rely on manual assessments, expert judgments, or statistical data from previous sales, which often leads to subjectivity, inaccuracies, and losses for both sellers and buyers. AI platforms make it possible to automate this process by using machine learning algorithms, big data analysis, and predictive models that account for a wide range of factors, including vehicle mileage, condition, year of manufacture, brand popularity, seasonal demand, economic conditions, and user behavior in online auction environments.

A distinctive feature of pricing optimization through AI platforms is that prices are no longer set statically or subjectively but are formed dynamically based on real data and analytics. Algorithms evaluate historical sales data, analyze competitive offerings, model supply and demand in real time, and predict which price will most likely result in a successful sale. Moreover, these systems can adapt to market changes and even to individual user behavior, such as their willingness to bid at certain levels. Some platforms integrate additional tools, including recommendations for sellers regarding the optimal timing for listing a vehicle for sale, or offer buyers personalized proposals that increase the likelihood of a successful transaction. The process of pricing optimization through AI platforms typically involves several stages. First, data about the vehicle are collected, including technical specifications, body and engine condition, mileage, service and accident history, as well as information about market conditions and demand for similar models. These data are then processed by machine learning algorithms that, based on statistical models and deep learning, generate a predictive price. The system can then suggest to the seller an optimal price range that maximizes the probability of selling at a favorable price. During an online auction, the price may change dynamically in response to demand, participant activity, and other factors, making the process more transparent and fair.

The application of AI platforms for pricing used vehicles provides several advantages. Vehicle valuation accuracy improves through consideration of multiple objective factors rather than subjective expert assessments. Process automation facilitates time and resource savings for sellers by reducing the need for manual information processing. Dynamic pricing intensifies competition among auction participants, which can positively affect the final sale price. Moreover, pricing process transparency increases buyer and seller confidence in online platforms, while analytical tools enable market trend forecasting and strategic decision planning for vehicle sales.

However, such systems have certain limitations. AI algorithms depend on data quality and volume: inaccurate or incomplete data can result in erroneous forecasts and incorrectly set prices. Model complexity may be inaccessible to users with insufficient digital literacy, complicating effective platform utilization. Automated systems do not always account for unpredictable factors, including local market fluctuations, emotional aspects of buyer behavior, or unexpected economic events. There is also a risk of excessive technology dependence when a seller relies entirely on system recommendations without conducting independent market assessment.

Table 1. Mechanism of Used Vehicle Pricing Optimization Through AI Platforms

Algorithm Stage	Process Description	Factors Considered	Vehicle Example	Result/Price
1. Data Collection	Automatic acquisition of vehicle information	Make, model, year, mileage, condition, service history, accidents	Toyota Corolla 2018, 50,000 km, no accidents	Data collected for processing
2. Initial Assessment	Algorithm evaluates baseline value	Average market prices, demand, seasonality	Preliminary price: $12,000	Baseline price determined
3. Market Analysis	Comparison with competitors and auction activity	Number of sales, participant bids, model popularity	Analysis of similar Toyota Corolla 2018 vehicles	Basis for price adjustment
4. Price Forecasting	Machine learning determines optimal price	Demand, bid history, user behavior	Algorithm forecasts $12,500	Optimal auction price
5. Dynamic Update	Price adjusts in real time during auction	Actual participant activity, new bids	Multiple bids increased demand	Price changes to $12,700
6. Seller Recommendations	System provides listing advice	Listing time, marketing tools	List vehicle during evening hours for greater activity	Increased probability of successful sale
7. Final Result	System analyzes transaction after auction completion	Final price, sale time, number of bids	Final price: $12,700	Sale completed with maximum benefit

Source: compiled by the author based on original research

In practice, used vehicle pricing optimization through AI platforms on online auctions occurs dynamically and is integrated into the sales process itself. The seller enters basic vehicle information, after which the system automatically analyzes historical data, compares similar market offerings, and considers potential buyer behavior, generating recommendations for the starting price and listing time. During the auction, AI algorithms continuously monitor bids, user activity, and demand for specific models, adjusting prices in real time to ensure optimal financial benefit for the seller while remaining competitive for buyers. This approach enables consideration of numerous factors that are difficult or impossible to assess manually, facilitates rapid response to market fluctuations, and creates a more transparent and fair sales process, increasing auction participant confidence and transaction efficiency. Several well-known platforms demonstrate practical AI application for used vehicle pricing and can serve as examples of such technology effectiveness. The CarKoto platform uses machine learning algorithms for vehicle value forecasting, considering market demand, seasonal fluctuations, and specific model characteristics, which enables increased valuation accuracy and transaction transparency.

AI Car Value targets the international market and enables sellers to rapidly obtain predictive prices considering mileage, vehicle condition, service history, and brand popularity, making the sales process more convenient and efficient. Services such as AutoAI Auction and CarPrice AI assist in determining optimal price ranges and recommend the best timing for listing vehicles at auction, increasing the probability of profitable sales. The popularity of these platforms stems from their capacity to automate the assessment process, save user time and resources, reduce risks of erroneous pricing decisions, and create a dynamic and transparent market where prices adapt to actual buyer activity and market conditions. Consequently, implementing such platforms increases trading efficiency, facilitates more accurate pricing, and establishes trust among online auction participants, which is particularly important for the used vehicle segment with its wide variety of models and vehicle conditions.

The application of AI platforms for used vehicle pricing also opens new possibilities for integration with other digital services, such as financing, insurance, and demand-supply analytics, making the sales process more comprehensive and convenient for users. Furthermore, such platforms can be utilized for market research, trend analysis, and strategy development to enhance sales efficiency, which benefits both large dealership companies and private sellers. Thus, used vehicle pricing optimization through AI platforms on online auctions represents a promising direction that combines the analytical capabilities of modern technologies with practical market needs. It enables increased vehicle valuation accuracy, ensures sales process dynamism and transparency, saves market participant time and resources, and facilitates predictive model development for strategic planning. Concurrently, limitations related to data quality, algorithm complexity, and excessive automation risk must be considered to ensure maximally effective and secure platform utilization under actual market conditions.

Conclusions. Optimizing used car pricing through AI-based online auction platforms demonstrates substantial potential for improving the accuracy, transparency, and efficiency of the sales process. The use of machine learning algorithms and dynamic data analysis makes it possible to account for a wide range of factors, predict optimal prices, and reduce the risk of valuation errors. At the same time, the effectiveness of such systems depends on the quality of input data, the adaptability of algorithms to market changes, and users' awareness of platform functionality. Overall, the application of AI platforms contributes to more balanced and economically justified pricing, increases trust among market participants, and creates new opportunities for strategic management of used car sales.

References

1. Araf, M. S. I., Hoque, S. F., Chowdhury, M. A., Rahman, M., & Alam, M. Z. (2025). Can artificial intelligence (AI)-based pricing achieve sustainability? A systematic review from business, customer, and policymaking perspectives. SSRN. https://doi.org/10.2139/ssrn.5079413

2. Rafsan, R., Rusho, M. A., Ahsan, J., Afrad, R. H., Dhrubo, A. F. H., Jahan, M. K., & Qayum, M. A. (2025, February 18–21). CarKoto: An AI-powered platform for transparent and precise used car price prediction in Bangladesh. In 2025 International Conference on Artificial Intelligence in Information and Communication (ICAIIC) (pp. 760–765). IEEE. https://doi.org/10.1109/ICAIIC64266.2025.10920683

3. Mullapudi, P. N. (2025). Pricing Optimization across Domains: A Comparative Review. International Journal of Emerging Research in Engineering and Technology, 6(3), 16-33. https://doi.org/10.63282/3050-922X.IJERET-V6I3P103

4. Zhang, Z., Chen, Z., Gümrükcü, E., Ji, Z., Ponci, F., & Monti, A. (2024). Advancing urban electric vehicle charging stations: AI-driven day-ahead optimization of pricing and Nudge strategies utilizing multi-agent deep reinforcement learning. eTransportation, 22, 100352. https://doi.org/10.1016/j.etran.2024.100352

5. Hota, A. (2024). Next-gen dynamic and deal-based pricing strategy in automotive and financial services [Preprint]. OSF Preprints. https://doi.org/10.31219/osf.io/emgpv

6. Sarkar, M., Ayon, E. H., Mia, M. T., Ray, R. K., Chowdhury, M. S., Ghosh, B. P., Al-Imran, M., Islam, M. T., Tayaba, M., & Puja, A. R. (2023). Optimizing E-Commerce Profits: A Comprehensive Machine Learning Framework for Dynamic Pricing and Predicting Online Purchases. Journal of Computer Science and Technology Studies, 5(4), 186-193. https://doi.org/10.32996/jcsts.2023.5.4.19

7. Selvakanmani, S., Shravani, R., & Sharmitha, V. (2024, March). Automated prediction for car resale values using AI. In 2024 10th International Conference on Advanced Computing and Communication Systems (ICACCS) (Vol. 1, pp. 1470–1474). IEEE. https://surl.lu/krweqm

8. Najeetha Banu, N., Harti, A. C., Meeran, N., Poornalatha, G., & Ajitha Shenoy, K. B. (2025). Dynamic Advertisement Pricing and Bidding Optimization: An Integrated Machine Learning and Auction Framework. IEEE Access, 1. https://doi.org/10.1109/access.2025.3615136

9. Chen, Q., Wang, X., Yang, C., Jiang, Z., Qi, S., Zhang, J., Li, N., Wang, L., & Xiao, J. (2024). Reverse double auction mechanism: An efficient algorithm for E-commerce platform operations. Electronic Commerce Research and Applications, 101401. https://doi.org/10.1016/j.elerap.2024.101401

10. Gong, Z. (2024). Optimization of cross-border E-commerce (CBEC) supply chain management based on fuzzy logic and auction theory. Scientific Reports, 14(1), 14088. https://doi.org/10.1038/s41598-024-64123-3