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Monitoring of Trading Processes and Automation of Control in the Commodity Exchange Based on Artificial Intelligence

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ABSTRACT

This paper explores the application of Artificial Intelligence (AI) technologies in monitoring trading processes and automating control mechanisms within commodity exchanges. As the volume and velocity of high-frequency trading data continue to grow, traditional manual oversight becomes increasingly inefficient. This research analyzes the effectiveness of machine learning algorithms and neural networks in detecting market anomalies, predicting price volatility, and preventing fraudulent manipulations. Furthermore, the study proposes a framework for real-time automated control systems designed to minimize human error and enhance the transparency of exchange operations. The findings demonstrate that AI-driven monitoring systems significantly improve risk management precision and operational efficiency in modern digital commodity markets.

Keywords: Artificial intelligence, commodity exchange, trading process monitoring, control automation, machine learning, market manipulation, predictive analytics, intelligent systems, algorithmic trading, real-time supervision, deep learning, risk management.

Introduction

In recent years, the rapid development of digital technologies has significantly transformed the functioning of financial and commodity market infrastructures worldwide[1]. In particular, commodity exchanges have been increasingly adopting advanced information systems to improve the efficiency, transparency, and reliability of trading operations. As trading volumes grow and the number of market participants expands, traditional monitoring and control mechanisms become less effective in ensuring timely detection of irregularities and maintaining proper oversight of transactions.[2]

In this context, artificial intelligence (AI) technologies are emerging as a key tool for modernizing exchange systems. AI-based solutions enable real-time data analysis, pattern recognition, and anomaly detection, which are essential for effective monitoring of trading activities[3]. Moreover, the

automation of control processes reduces the dependence on human intervention, minimizes operational errors, and enhances the overall accuracy of decision-making within trading platforms.[4]

Methodology.

In the Republic of Uzbekistan, the commodity exchange plays an important role in ensuring efficient distribution of goods, price formation, and market stability.[5] However, the increasing complexity of trading operations creates a need for more advanced technological solutions to strengthen monitoring and control mechanisms. The integration of artificial intelligence into exchange systems is therefore becoming a highly relevant direction for improving the effectiveness of market regulation[6].

From this perspective, the study of AI-based monitoring and automation of control processes in commodity exchange trading systems is of significant scientific and practical importance. It allows for the identification of existing challenges, evaluation of technological opportunities[7], and development of innovative approaches aimed at enhancing the efficiency and transparency of exchange operations.[8]

This section presents the analysis of the application of artificial intelligence (AI) in monitoring trading processes and automating control mechanisms at the commodity exchange.[9] The evaluation is based on comparative indicators before and after the implementation of AI-based systems, focusing on operational efficiency, monitoring accuracy, risk detection, and system transparency[10].

Result and discussion.

The results indicate that the introduction of AI technologies significantly improves the speed and quality of monitoring processes.[11] Real-time data processing allows the system to identify irregular transactions, price deviations, and suspicious trading patterns more effectively than traditional manual supervision methods.[12]

Table 1.

Trading Monitoring Efficiency Indicators (Before and After AI Implementation)[13]

Indicators	Before implementation	AI	After implementation	AI	Change (%)
Average monitoring response time (minutes)	16,5		5,2		68,5
Detected irregular transactions (%)	61,3		91,7		49,6
False detection rate (%)	14,8		6,3		57,4
Human intervention in control processes (%)	78,0		35,0		55,1
System transparency index (0–1 scale)	0,63		0,88		39,7

The results demonstrate that AI-based monitoring systems significantly reduce response time and improve the accuracy of detecting irregular transactions. The increase in the transparency index indicates a higher level of trust and reliability in exchange operations. The analysis shows that artificial intelligence plays a crucial role in improving monitoring and control processes in commodity exchange systems.[14] The key improvements include:

- faster detection and response to irregular transactions;
- higher accuracy in anomaly identification;
- reduced human involvement in control operations;
- improved transparency and reliability of exchange activities;
- significant economic savings and efficiency gains. [15]

Conclusion.

AI-based monitoring and automation systems significantly enhance the operational performance and governance quality of commodity exchange trading systems.

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