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DIGITAL TRANSFORMATION AND ARTIFICIAL INTELLIGENCE

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Abstract
The article analyzes the application of big data technology in the economy and discusses issues related to its improvement. Statistical data and analytical reviews are used, drawing from scientific publications on the topic both in Uzbekistan and abroad. In addition, the main problems of using big data in the economy are highlighted.

Keywords: Big data, economy, information system, requirements, artificial intelligence, machine learning, database, automation, financial reporting.

Introduction

With the advancement of technology, the volume of data available to finance and business is growing at a geometric rate. Existing methods of processing and storing such data are no longer sufficient, creating the need for special algorithms and methods capable of handling and analyzing massive data volumes. This gave rise to what is now known as Big Data. The term "Big Data" first emerged in 2008 and has been in regular use ever since.

The rapid increase in the number of connected devices across various sectors and the ongoing development of digital transformation contribute significantly to the expansion of Big Data. By 2024, it is estimated that 2.5 quintillion bytes of data will be generated every day. The total volume of data created worldwide in 2024 is expected to reach 147 zettabytes — an increase of 27 zettabytes compared to the previous year. This reflects a 22.5% rise in global data production year-over-year.

Moreover, by 2025, the total global data volume is projected to reach 181 zettabytes.

A staggering amount of activity occurs online every minute. Millions of messages, emails, and text data are sent, downloaded, and circulated. For

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instance, Google processes 6.3 million search queries every minute — that's about 105,000 queries per second. Additionally, 241 million emails are sent every minute.

Due to the growing importance of data analysis, the global Big Data market is projected to reach $348.21 billion by the end of 2024. By 2029, the market is forecasted to grow to $655.53 billion.

Big Data is no longer just a massive warehouse of general information. Rather, it consists of tools that enable rapid processing and analysis of data while saving time and effort. These tools are widely used to collect statistics, conduct analyses, and make forecasts. For example, Big Data is extensively used in marketing to analyze collected data and generate insights based on specific socio-demographic characteristics of user groups

This article examines the application of Big Data technologies in the economy and analyzes issues related to improving their implementation. Statistical data and analytical reviews were drawn from both domestic and international academic publications related to the topic in Uzbekistan and abroad. Additionally, the main challenges of applying Big Data in economic contexts are identified.

In this article, the prospects of using Big Data in the economy, its implementation strategies, and recent factual and statistical developments concerning supplementary data are thoroughly explored.

Review of Related Literature

The concept of Big Data is being actively researched by both Uzbek and international experts for its practical use in managing organizations across various fields of knowledge and sectors. Scholars are especially focused on enhancing managerial processes through its application. For example, researchers V. A. Boburin and M. E. Yanenko from the Saint Petersburg State University of Economics have published significant academic work on the prospects of developing Big Data–based service markets.

Researchers analyzed how Big Data technologies could be utilized to enhance the competitiveness of companies and proposed recommendations for applying Big Data in marketing strategies to support innovative development. These

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recommendations are directed toward improving services in the market using Big Data technologies.

In 2015, K. Close, C. Meier, and M. Ringel conducted a study on optimizing trade strategies and entering new markets using geoanalytics. According to the authors, pharmaceutical companies typically allocate between 20% to 30% of their average profits toward management and sales. Their research suggests that if companies more actively utilize Big Data to identify the most profitable and rapidly developing markets, they could significantly reduce operational costs.

According to researcher S.R. Das, Big Data technology is poised to fundamentally transform both the economy and politics. As an example, he refers to credit rating agencies, which use neural networks to generate reports. These systems employ standard statistical methods based on Big Data to identify relationships among economic variables without requiring human intervention.

At the same time, it is worth noting that the use of Big Data technologies for evaluating companies' economic performance is still underdeveloped. This indicates a clear need for researchers to focus on this area of scientific knowledge—not only from a theoretical and methodological point of view but also from a practical perspective, particularly regarding how companies in various economic sectors are managed.

Research Methodology

This article applies a combination of systematic, comparative, and financial analysis methods. The research materials include statistical data and analytical reviews, as well as articles published in both Uzbek and international academic journals on the topic. During the preparation of the article, the analytical data and informational materials collected were synthesized and structured according to scientific-methodological standards. These standards relate to the development prospects of the Big Data market and its associated tools.

Results and Discussion

The expansion of the Big Data market is influenced by numerous important factors. The growing demand for enhanced data analysis is driven by the exponential increase in data volumes originating from various sources, including

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social networks, Internet of Things (IoT) devices, and digital transactions. Companies are increasingly turning to Big Data to improve customer service, make more effective decisions, and extract valuable insights.

Artificial Intelligence (AI) and cloud computing technologies ensure the efficient processing, analysis, and storage of large datasets.

Organizations are also adopting solutions to work with Big Data due to the growing need for operational efficiency and increased competitive pressure. Strict data governance procedures are necessary not only for effective data management but also to comply with regulatory requirements and corporate compliance standards【10】.

In 2021, the global Big Data analytics market was valued at $240 billion. According to forecasts, it is expected to reach $655.53 billion by 2029.

The Big Data market is projected to grow from $137.23 billion in 2023 to $154.79 billion in 2024, with a compound annual growth rate (CAGR) of 12.8%. Historical growth has been driven by the explosion of data, advances in business analytics, the need to meet regulatory demands, and the desire to gain competitive advantages (see Figure 1).

The rapid growth of the Big Data analytics market is primarily attributed to the exponential increase in data volume, rising demand for cloud computing, and the widespread digital transformation across all industries.

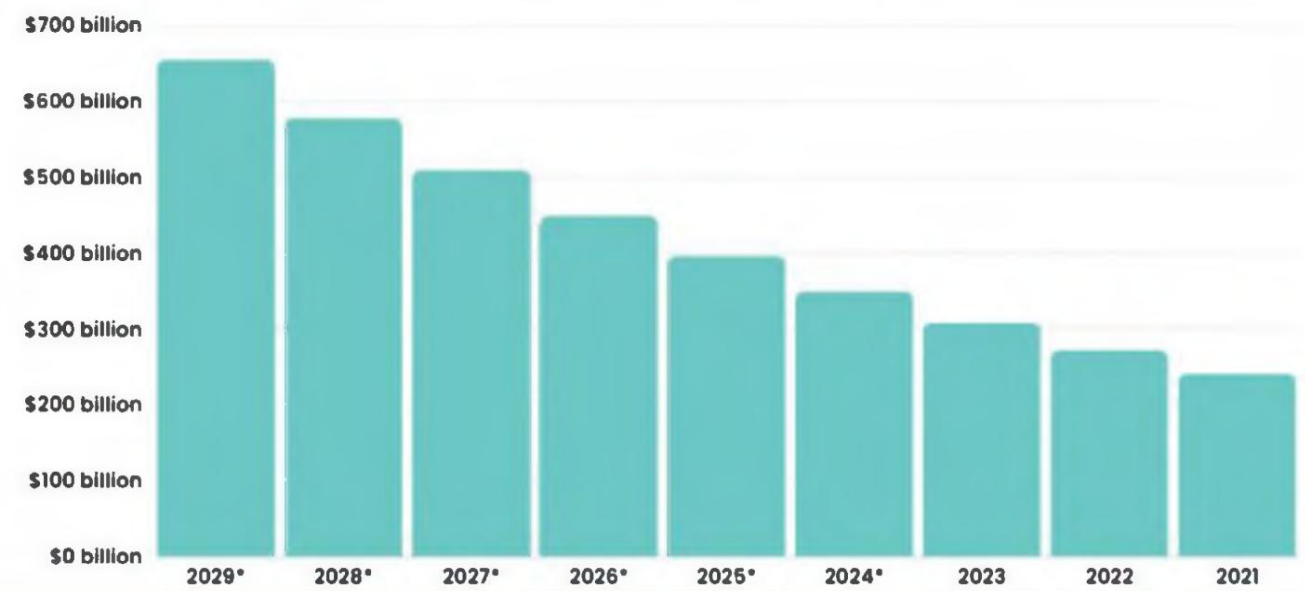

Figure 1. Global Big Data Analytics Market Volume

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To store data or Big Data, companies use either their own servers, specialized data centers with high-performance infrastructure, or cloud storage solutions offered by providers like Amazon, Microsoft, or Google.

In the economy, Big Data plays a critical role because this technology enables deeper analysis of economic processes, improves trend forecasting, and supports more informed decision-making. Below are some of the key areas where Big Data is applied in the economy:

1. **Consumer demand analysis** – Transaction data, website visits, and information from social networks help analyze consumer preferences. This allows forecasting demand for products and services and helps refine marketing strategies.

2. **Macroeconomic analysis and forecasting** – Big Data enables the processing of large volumes of information from multiple sources (e.g., financial transactions, price indices, unemployment rates), which helps forecast macroeconomic indicators like GDP, inflation, and unemployment.

3. **Financial market analysis and asset price forecasting** – Machine learning and Big Data are used to analyze financial market dynamics, forecast the prices of stocks, bonds, commodities, and currencies, and thereby assist in risk management and investment strategy development.

4. **Real-time inflation rate estimation** – By collecting price data from online stores and other sources, Big Data helps track price changes of various goods and services. This makes it possible to estimate inflation rates accurately and forecast their dynamics.

5. **Labor market research** – Big Data compiles data from job search platforms, social networks, and worker profiles to monitor employment trends and skills gaps. It also helps employers find suitable candidates more efficiently.

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6. **Optimization of tax policy** – By gathering and analyzing data on taxpayer behavior, income levels, and consumption, governments can design more efficient and fair tax policies.

7. **Supply chain optimization in the economy** – Big Data supports better production planning by helping reduce transportation and storage costs and analyzing market demand and resource availability.

8. **Assessment of the environmental and social impact of economic activity** – Through Big Data, information is collected on waste, resource usage, and other factors, enabling precise evaluation of economic activity's environmental and social effects and the formulation of sustainable economic strategies.

Big Data in Uzbekistan

The Big Data market in Uzbekistan is not yet highly developed, primarily because the penetration rate of Big Data technologies remains low. However, there is significant potential for implementation, and the market is now entering a phase of rapid development. Still, some sectors remain underrepresented — for example, limited use of bank cards makes it difficult to gather data on consumer spending, complicating the creation of accurate predictive models.

Nonetheless, Big Data is already being used in major banks in Uzbekistan. For instance, **TBC Bank** employs a scoring model to manage debt collection, while **Uzsanoatqurilishbank** has implemented a data warehouse and business analytics system. These tools allow the bank to collect and process data from various sources.

When more companies—both corporations and startups—begin using and analyzing Big Data, the overall effectiveness of analytics increases. This development is accompanied by other shifts as well, such as a rise in the number of skilled data analysts and the growth of technological know-how and infrastructure in sectors like telecommunications and banking.

The global Big Data technology market is segmented into various application areas, including customer analytics, data analytics, optimization of corporate data warehouses, fraud detection and compliance, and operational analytics.

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Despite the vast potential of Big Data, data alone is not a universal solution or a guaranteed key to success. It is crucial that companies not only collect, analyze, and cluster data intelligently but also learn how to derive real value from it.

Another issue is technological barriers—existing methods still can't collect and process many types of data, and in some cases, invoices and records are insufficient. In Uzbekistan, this problem is particularly significant. The banking system is still in early development, and data on consumer behavior and standards is limited.

A further challenge involves data sharing and privacy. Big Data providers are often reluctant to share data with each other, which makes it harder to gain a comprehensive understanding of consumer habits. Secure computing technologies, such as cryptographic protocols like blockchain, may offer a solution by enabling the safe and private exchange of data.

It is worth noting that in our country, the dynamics of economic processes show a growing and active application of Big Data technologies in the financial sector. The government's support for programs aimed at developing local technologies and replacing imports helps promote technological sovereignty and encourages collaboration between the state, business, and society. This, in turn, drives the creation of domestic innovative, technological, and infrastructural solutions that contribute to national economic growth.

Big Data is playing an increasingly integral role in development. On a practical level, it enhances the effectiveness of digital tools and creates a platform for advancing other promising digital economy technologies.

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