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Research Article

ESSENCE OF BIG DATA

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ABSTRACT

In this article, we consider the rapidly developing sphere in the digital economy - big data, which in the modern world allows governments, businesses and social structures to turn tons of heterogeneous information into structured knowledge. The experience of developing the big data science in the leading countries of the world is discussed and, using their example, the possibility of implementing big data in Uzbekistan is considered.

KEYWORDS

Digital economy, digitalization, Big Data, semi-structured and unstructured data, blockchain, infrastructure provider, dataminer, system integrator, developer of ready-made services, clouds.

INTRODUCTION

The era of the information revolution has affected all areas of business and every person on earth. Vast flows of data and information create more economic value than global trade in goods. Business ideas built on data create new opportunities for economic growth and solving society's problems.

Each stage of development was characterized by a certain resource, so the main resource in the era of agricultural civilization was land, and in the era of industrial civilization - raw materials and fuel.

In the era of the digital economy, data and human digital literacy have become the main resource. Clive

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Humby, a British mathematician and the architect of Tesco's Clubcard, was one of the first to compare the data to new oil. Oil is valuable, but it cannot be used in its unrefined form. How oil must be converted into gas, plastic, chemicals, etc. to create a valuable substance that contributes to profitable activities; Likewise, data needs to be broken down into parts and analyzed so that they have value."[3]

One of the authoritative online resources, Wired, also compared the information and its analysis to oil. In the 18th century, not everyone understood the potential profitability of oil production, but those who did managed to make a fortune from it. The same awaits us with information. [4]

Chinese General Secretary Xi Jinping noted during his visit to the Chinese Academy of Sciences in 2023: "Big data is a "free" but very valuable resource in the digital economy. The one who controls the data will gain an advantage" and become a leader.

BIG DATA ENTITY

The term "big data" also refers to the presence of data larger than 100 GB. The German Ministry of Labor managed to reduce costs by 10 billion euros by introducing Big Data technology into the process of issuing unemployment benefits. It was revealed that some citizens received these benefits without reason. Digital literacy is a set of competencies and literacy that is necessary for the effective use of digital technologies and information.

An Accenture study, which involved more than 1 thousand company executives from 19 countries, showed that the main advantages of Big Data are: the search for new sources of income, new products and services, the influx of new clients, and others.

To remain competitive, companies need to extract information from vast and diverse sets of data. Those companies that have learned to analyze and use big data have a bright future.

Research into the digital economy begins with big data. Clifford Lynch in his article "How does your data grow?" [5] noted that there is an explosive growth in global volumes of information and businesses need to take advantage of the opportunities provided by large amounts of data. This means that it is necessary to constantly collect, study, organize, transform, and store data in order to identify useful information, conclusions, put forward fresh ideas, and justify new decisions.

Big data is a combination of proven and emerging technologies that allows companies to extract information from existing data to use in their operations. Big data can be defined as the ability to manage large volumes of heterogeneous data at a speed sufficient to analyze such data in real time and respond in a timely manner. [6][7]

Sources of big data are the Internet and social networks, events related to user actions in various applications, transaction flows of bank payments, data from the world of the Internet of Things. All this variety

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of data can be divided into structured, semi-structured and unstructured data. 20% of the total data volume is structured data, which has a specific length and format. These are numbers, dates or combinations of words and numbers, such as the customer's name and address. Unstructured data makes up 80% of the total data volume and does not have a specific format. These include posts on social networks, photos, website content, satellite images, recordings from surveillance cameras and video recorders.

The need to store and process ever-increasing volumes of big data in order to extract useful information from it has led to the emergence of new storage technologies and big data analytics methods. Innovative technologies such as Map Reduce, Hadoop and BigTable have given rise to a new generation of data management systems aimed at quickly discovering new knowledge in data and identifying the actions, products and services that can be derived from the extracted knowledge.

A set of methods for detecting non-obvious, objective, practically useful and understandable patterns in data for decision making is in-depth analysis (Data Mining).

Text Mining technology covers new methods for performing semantic text analysis, information retrieval and management, including sentiment research. Can be used to analyze large and ultra-large arrays of unstructured information.

Call Mining technology combines speech recognition, speech analysis and Data Mining. Its goal is to simplify searches in audio archives containing recordings of conversations between operators and clients.

Web Mining technology covers methods that are capable of discovering new, previously unknown knowledge based on site data and which can later be used in practice. Web Mining technology uses Data Mining technology to analyze unstructured, heterogeneous, distributed and large-volume information contained in Web sites.

Согласно характеристикам, которые компания Meta Group определила for big data, they have the following features:

- volume - from 150 GB per day;
- speed (velocity) - the continuous creation of a large amount of data places high demands on the speed of their processing;
- variety (variety) - modern technical means allow you to analyze any structured and unstructured information;
- reliability (veracity) - reliability of data and results of their analysis;
- variability - data flows are not always stable; a variable data flow is more difficult to analyze;
- value - the value and significance of information. Big data can be simple (social media posts) or complex to understand and analyze (bank transactions).

Market research reports have shown that the volume of data is growing at an incredible rate. According to IBM, by 2003 the world had accumulated 5 exabytes of data; by 2008, this volume increased to 0.18

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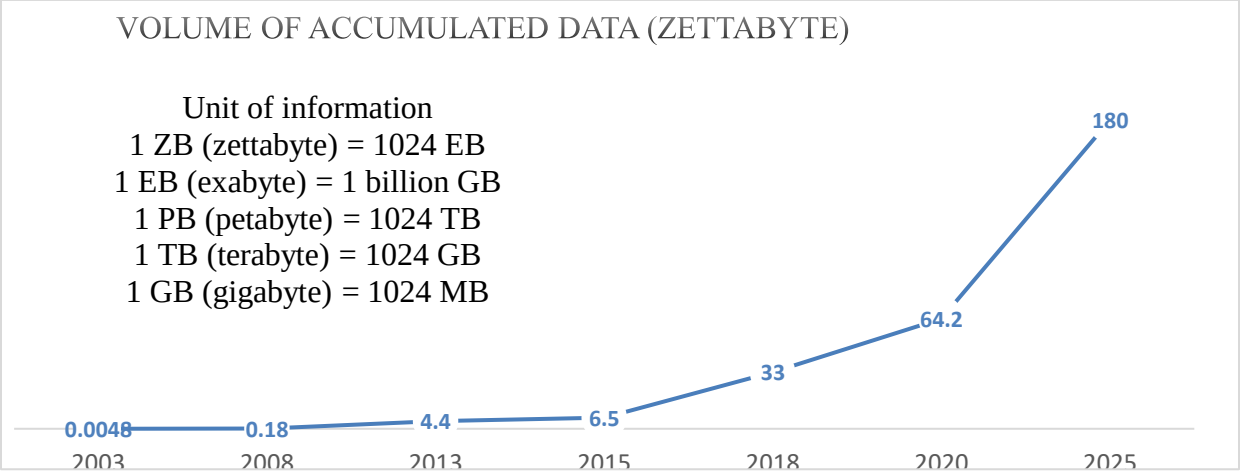
zettabytes; in 2013, the figure was 4.4 zettabytes. According to Statista, the volume increased to 64.2 zettabytes in 2020 and 79 zettabytes in 2021, with growth projected to more than 180 zettabytes by 2025. In 2035 it will grow exponentially to more than 2100 zettabytes.



Rice. 1 Dynamics of data volume growth.

The volume of data generated and synthesized reached a new high in 2020, driven by increased demand due to the COVID-19 pandemic. The crisis caused by the spread of the new coronavirus has intensified the transition from working offline to permanent online, i.e. More people worked and studied from home and took advantage of home entertainment more frequently.

Effective and competent use of Big Data provides enormous benefits. Big data processing makes it possible to make analysis predictive and offer business recommendations for the future. Today Big Data is used in government administration, industry, medicine, trade, agriculture, real estate market, sports, tourism, transport, and construction. Big data analysis in public administration helps make decisions regarding employment, economic regulation, and security. In industry, implement a predictive production system to forecast more accurate demand for products. In agriculture, for example, using the precision farming method, process information collected from sensors of special weather stations that are located in the fields, building a highly accurate hourly weather forecast. Developers working in the real estate market use Big Data technologies to analyze information flows and provide clients with the options that are most interesting to them. This way, the buyer can get acquainted with the house he likes without the seller. In sports, big data processing makes it possible to select the most promising athletes and develop effective strategies for both athletes and each opponent. In business, Big Data provides such

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advantages as simplifying the planning process, increasing the speed of launch and demand for new projects, optimizing integration in the supply chain, growing the target audience, improving the quality of customer service, which in turn leads to the loyalty of current customers.

BARC reports that organizations are reaping the benefits of using Big Data - a 69% likelihood of making better strategic decisions, a 54% likelihood of improved control over operational processes, a 52% likelihood of better understanding customers, and a 47% likelihood of effectively reducing costs. Organizations that take advantage of Big Data report an average 8% increase in revenue while reducing costs by 10%.

Structure of Big Data.

The Big Data system includes infrastructure providers, data miners, system integrators, consumers and developers of ready-made services. Let's consider each element of this system.

Infrastructure providers. One of the problems associated with big data is its storage. Infrastructure providers solve the problems of data storage and preprocessing. There are three main ways to store data: traditional, public clouds and private clouds.

In the traditional ("self-storage") method, information is written to disks, tapes, or local storage. With this method, the data is always nearby, so it is familiar and calmer, you can easily and quickly connect to local media, and the price is usually acceptable. But they are unreliable, since disks and servers can fail due to physical wear and tear, they cannot be accessed if you are far away, and the capabilities of the media are limited (you need to buy new media and place them somewhere).

Data storage is provided by public clouds for a fee depending on the volume of data and related services. The top five countries providing cloud technologies include the USA, China, Great Britain, Germany and Japan (Fig. 2). One of the first companies to make money in a completely new way by providing its unused computing resources was Amazon. Today, the largest cloud providers are Amazon Web Services (AWS), Microsoft Azure, Google Cloud, IBM Bluemix, Oracle. The leader in the global big data storage market is Amazon. Chinese companies are quickly catching up with foreign competitors in the cloud services race. The leaders in the Chinese cloud services market are Alibaba (Alibaba Cloud), Tencent (Tencent Cloud), Huawei (Huawei Cloud) Baidu (Baidu Cloud).

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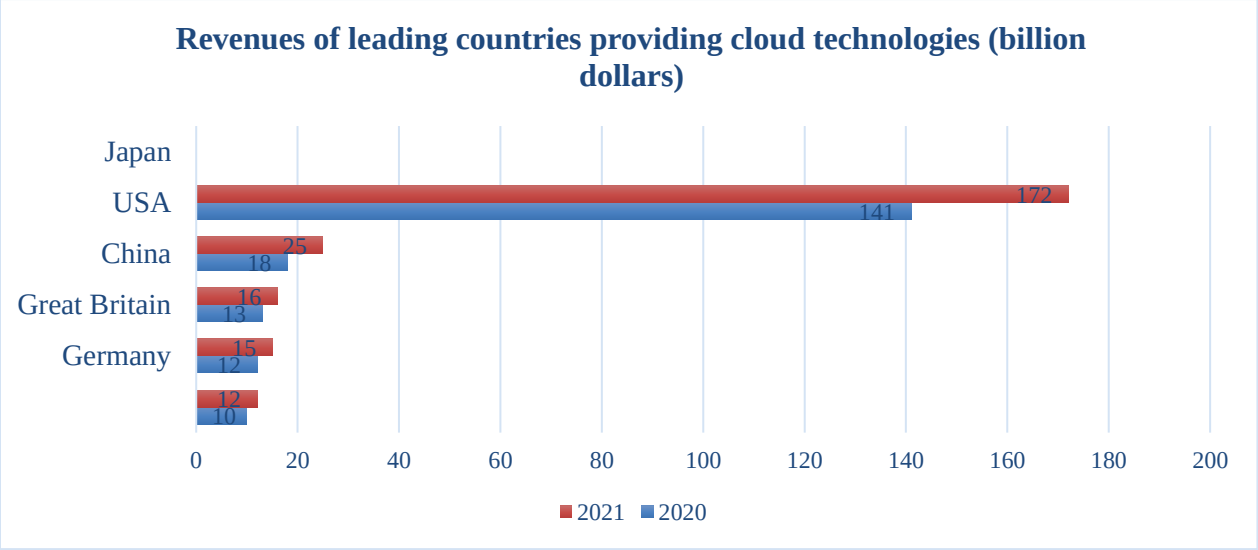

Fig.2 Income of the leading countries providing cloud technologies. [8]

If we talk about the advantages of public clouds, we can highlight the following parameters:

- convenience (companies do not need to purchase and maintain physical servers, which simplifies basic work scenarios as much as possible);
- relative security (most providers provide data protection with their own encryption algorithms);
- reasonable prices (prices fluctuated at the level of 5-10 cents per gigabyte per month, and currently there is a downward trend);
- relative reliability (in case of loss, there is the possibility of data replication);
- new opportunities in the future.

The disadvantages of public clouds include the psychological factor (the feeling that someone else has access to your data), access speed (Internet access speed is measured in megabytes per second, which is tens of times slower than access to local storage), prices (cloud storage is more expensive than local storage).

Private clouds are storage facilities that are part of a company's infrastructure and are used only by its employees. These storage facilities are used by the corporate sector.

Currently, Scandinavian companies are leading the implementation of corporate cloud services in Europe (Fig. 3)

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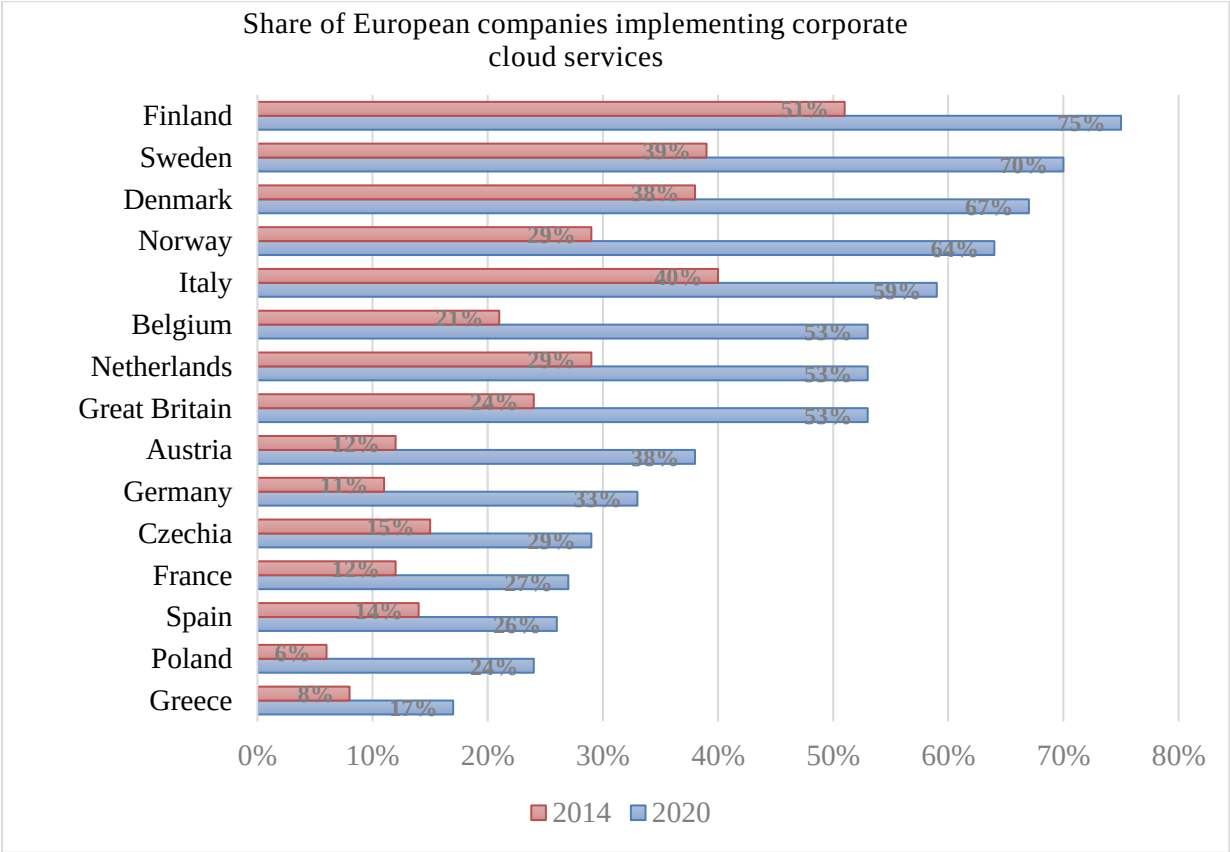

Fig.3. Share of companies implementing enterprise cloud services in selected European countries [8].

System integrators are companies or individuals who offer solutions for automating business processes. Based on the developed project, they connect automated systems with each other, which ensures the effective operation of the team or the entire organization as a whole.

According to Gartner's glossary, a systems integrator's job is to bring order to systems provided by disparate vendors. In particular, system integrator companies are engaged in: implementation, planning, coordination, scheduling, testing, improvement, and maintenance of information systems.

Data miners are specialists engaged in searching, intelligent and in-depth analysis of data. Based on the analysis, you can get an idea of the dependencies of the data, and based on these connections, make assumptions for building neural network models. For example, an analysis of the behavior of buyers of household appliance stores can show that people prefer to buy refrigerators on credit, while when buying a computer, customers also buy printers. Such dependencies subsequently help to make more effective management decisions and increase sales.

Developers of ready-made services develop ready-made solutions based on access to big data. For

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example, Value Appz offers entrepreneurs a ready-to-use, cost-effective platform for creating apps and web solutions that will enable the digital transformation of their businesses. For example, the platform offers application development for various types of businesses, such as custom delivery (food, groceries, medicines), household services (repair work, beauty treatments at home, car washing, dog walking), online consultations (doctor, nutritionist, teachers , fitness trainers), online stores (jewelry, clothing, books, gifts), which is designed to meet the requirements of various business verticals. The entrepreneur is provided with a highly reliable solution to attract customers, maximize profits and stay ahead of competitors in the chosen field.

Artificial intelligence is perfectly suited for processing large amounts of constantly changing information. The machine does everything that a human would do, but the likelihood of error is greatly reduced.

Blockchain is a distributed ledger technology that allows you to speed up numerous Internet transactions. This technology reduces costs.

A data lake is "raw" information, as if there is a fish in a river, we don't know what fish it is.

Data Lake data is like a fish in a lake that got there from the river, but it is not known exactly what kind of fish it is and where it is located.

Prospects for the development of Big Data in Uzbekistan

The contribution of the digital economy to the US gross domestic product is 10.9%, in China - 21%, in India - 5.5%. In Uzbekistan, this figure does not exceed 2 percent.

2020 in Uzbekistan was declared the Year of Development of Science, Education and Digital Economy. In order to form and develop the digital economy of our state, the "Digital Uzbekistan - 2030" strategy was approved in 2020. The strategy provides for breakthrough activities in such priority areas as digital infrastructure, e-government, digital economy, national digital technology market, and training of specialists in the field of information technology. For 2020-2023, activities are planned aimed at increasing the level of coverage of connecting settlements to the Internet, laying 20 thousand kilometers of fiber-optic connections, introducing more than 400 information systems for the socio-economic development of regions, introducing over 280 information systems to automate management processes , implementation of the "One Million Programmers" program, within the framework of which it is planned to train 500 thousand boys and girls in the basics of computer programming, implementation of the "Digital Department" project.

The introduction of the Electronic Government system, through which 178 types of services are provided through a single portal of interactive government services, ensures openness, transparency, saves time and reduces costs for the population.

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As part of the "Digital Uzbekistan – 2030" strategy, 13 exemplary cities and districts were identified, in which, based on the developed "road maps," digital transformation work will be carried out over three years. During 2020-2021, in accordance with the Road Maps, 172 projects will be implemented to expand digital infrastructure, 54 projects to introduce digital technologies in public administration, 190 projects in the social sphere, 45 in housing and communal services, 51 in agriculture economy, 17 in industry, 58 projects are aimed at training managers and employees.

The State Tax Committee of the Republic was one of the first to launch a major project providing for the improvement of the existing complex of information systems of tax authorities, taking into account the reengineering of tax administration business processes. The project became the basis for an automated VAT payment control system, the purpose of which was to monitor VAT payment in real time.

In the development strategy of the new Uzbekistan, proposed by the President of the Republic Sh. Mirziyoyev, one of the key points in the development of the new Uzbekistan is the development of the digital economy in such areas as communications and telecommunications, information security, education, healthcare, finance and banking, construction, agriculture and water management, energy, transport, mechanical engineering, etc. Uzbekistan is already missing out on financial and economic benefits of 5-7% in relation to the country's GDP annually. The introduction of technologies such as blockchain, big data, cloud computing, artificial intelligence will lead to GDP growth of 30% and an increase in real income of the population to 45 million soums per year by 2030, in the long term these indicators can grow to 50% of GDP and 50 million .sum per year in 2040-2050.

CONCLUSION

Big Data, a rapidly developing branch of the digital economy in response to the reactive increase in the volume of heterogeneous information in the world, has become one of the most powerful tools for forecasting, regulation and response on a global scale. Effective management of big data is becoming extremely valuable in generating profits for large data companies and countries that pay special attention to it. The rudiments for the use of big data have already been created in Uzbekistan, but improving this technology can become a strong impetus for the development of the digital economy in the state, which in turn has the potential to increase the country's GDP by up to ten percentage points.

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