

УДК 339.138:004.9

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THE MAIN TRENDS IN THE DIGITAL ECONOMY AND FINANCE THAT SHAPE THE CURRENT LANDSCAPE AND VECTOR OF DEVELOPMENT OF INDUSTRIES¹

The article analyzes and substantiates the fact that nowadays, and it can be stated with certainty, the world volume of digitized information is growing exponentially. And the size of these data sets is so large that traditional programs for their processing can no longer cope with them.

Let us rightly ask ourselves the question: can we (humanity) cope with such a volume of digitized information (Big Data)?

Thus, according to IBS calculations, in 2013 only 1.5% of accumulated data sets had information value. And by 2025, according to forecasts, humanity will have already generated more than 100 zettabytes of information. Fortunately for us, the world will be saved by Big Data processing technologies. They will allow people to embrace the immensity and benefit from it.

And this gives unprecedented opportunities to optimize all spheres of our life: public administration, medicine, telecommunications, economy and finance, transport, production, it improves the efficiency and competitiveness of companies around the world, etc.

Here we especially emphasize that in the field of digital finance, the prospects for Big Data development are even more promising. Thus, with the emergence of new technologies and the growth of data volume, new areas of special interest are also emerging, namely: the provision of financial services thanks to the revolutionary movement known as Open Banking, digital wallets and contactless payments, blockchain technology and cryptocurrencies, robo-advisors (advisors) and financial services based on artificial intelligence, embedded finance, etc.

And this really provides unprecedented opportunities to optimize and manage all areas of our life.

Keywords: *Big data, information architecture, bulk storage, e-commerce platform, business tasks, asset management using algorithms and artificial intelligence, economics and finance, digital finance.*

¹Статья публикуется в авторской редакции

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ОСНОВНЫЕ ТРЕНДЫ В СФЕРЕ ЦИФРОВОЙ ЭКОНОМИКИ И ФИНАНСОВ, ФОРМИРУЮЩИЕ СОВРЕМЕННЫЙ ЛАНДШАФТ И ВЕКТОР РАЗВИТИЯ ОТРАСЛЕЙ

В статье анализируется и обосновывается тот факт, что в настоящее время, и это уже можно с уверенностью констатировать, мировой объем оцифрованной информации растет по экспоненте. И размер этих наборов данных настолько велик, что традиционные программы для их обработки уже не могут с ними справиться. Справедливо зададимся вопросом, а сможем ли мы (человечество) совладать с таким объемом оцифрованной информации – Big Data (больших данных)?

Так, по расчетам IBS, в 2013 году только 1,5% накопленных массивов данных имело информационную ценность. А к 2025 году, по прогнозам, человечество уже сформирует более 100 зеттабайтов информации. К нашему счастью, мир спасут технологии обработки Big Data. Они позволят людям объять необъятное и получить из этого пользу. А это дает беспрецедентные возможности оптимизации всех сфер нашей жизни: государственного управления, медицины, телекоммуникаций, экономики и финансов, транспорта, производства – оно улучшает эффективность и конкурентоспособность компаний по всему миру и т.д.

Здесь особо подчеркнем, что в сфере цифровых финансов перспективы развития Big Data еще более многообещающие. Так, с появлением новых технологий и ростом объема данных появляются и новые направления, которые представляют уже и особый интерес, а именно: предоставление финансовых услуг благодаря революционному движению, известному как Open Banking (открытый банкинг), цифровые кошельки и бесконтактные платежи, технология блокчейн и криптовалюты, роботосоветчики (консультанты) и финансовые услуги на основе искусственного интеллекта, встроенное финансирование и т.д.

И это действительно дает беспрецедентные возможности оптимизации и управления всех сфер нашей жизнедеятельности.

Ключевые слова: большие данные, информационная архитектура, объемное хранилище, платформа электронной коммерции, бизнес-задачи, управление активами с помощью алгоритмов и искусственного интеллекта, экономика и финансы, сфера цифровых финансов.

Introduction. As we noted in our publications earlier, the global volume of digitized information is growing exponentially [1]. And the size of these data sets is already so large that traditional programs for processing them can no longer cope with them.

Thus, according to the IBS company, in 2003 the world accumulated 5 exabytes of data (1 EB = 1 billion gigabytes) [2]. By 2008, this volume grew to 0.18 zettabytes (1 EB = 1024 exabytes), by 2011 to 1.76 zettabytes, and by 2013 to 4.4 zettabytes. In May 2015, the global amount of data exceeded 6.5 zettabytes. By 2020, humanity is projected to generate 40 to 44 zettabytes of information. And by 2025, according to forecasts, humanity is already expected to generate more than 100 zettabytes of information.

Let us rightly ask ourselves the question: can we (humanity) cope with such a volume of digitized information - Big Data?

Thus, according to IBS calculations, in 2013 only 1.5% of accumulated data sets had information value. Fortunately for us, the world will be saved by Big Data processing technologies. They will allow people to embrace the immensity and benefit from it [3].

Moreover, sometime in the early 2010s, big data science ceased to be a purely academic discipline. And under the influence of the popularization of big data, data science turned out to be a promising business. And at the same time the profession of data scientist became one of the most popular and highly paid in the world.

Today, knowledge of Big Data is already being applied to neural networks. The fields of application of this technology include image processing, speech recognition, neural machine translation, computational pharmaceuticals and other breakthrough technologies implemented by IT giants like Google, Facebook and Baidu, etc. Big Data has become one of the most demanded areas of information technology. Deep knowledge of Big Data has thus become one of the most sought after areas of information technology.

Here we would like to emphasize that proper and timely Big Data analysis often requires specialized technologies, algorithms and computational resources. It also helps to see hidden patterns that are invisible to the limited human perception [4].

And this provides unprecedented opportunities to optimize all areas of our lives: public administration, medicine, telecommunications, economics and finance, transport, production, it improves the efficiency and competitiveness of companies around the world, etc.

Methodology and objects of research. The theoretical basis of the research was the works of domestic and foreign authors in the field of IT-technologies, digital economy and finance, banking.

The information base of the study is statistical data of companies with well-known global brands, historical events and facts, objective analysis of the state of the modern world economy.

The graphical method of information presentation, abstract-logical and induction method of research were used, the method of comparative analysis was applied.

Universal decimal classification, library and bibliographic classification, JEL-classification were used.

Results and discussion. I would like to start my research on this topic by defining 8 terms.

1. “Big data” are huge volumes of heterogeneous and rapidly arriving digital information that cannot be processed by traditional tools [3].

In the Russian-speaking environment, big data also refers to technologies of their processing. In world practice big data is referred to only as the object of analysis.

The term “big data” was born in 2008. Clifford Lynch, the editor of Nature magazine, used this expression in a special issue devoted to

the explosive growth of the world's information volumes.

Although of course big data itself existed earlier. Thus, according to some experts, the category of big data includes the majority of data streams over 100 GB per day.

And in recent years, big data has actually ceased to be a term. Journalists and entrepreneurs abused it a lot, and the meaning became blurred. Russian experts are still arguing about whether big data includes tools for working with it. Western experts consider the term definitively discredited and suggest abandoning it.

2. “Data lakes” is a raw storage of big data. Data lakes store data from different sources and different formats. This is much cheaper than traditional storages that store only structured data. Data lakes allow you to analyze big data in its original form. In addition, data lakes can be used by several employees at the same time.

3. “Data science” is a discipline that studies the problems of analyzing, processing and presenting information in digital form. In 1974, when Danish computer scientist Peter Naur published the book “A Basic Principle of Data Science”, the term originated.

And since the early 2010s, data science has ceased to be a purely academic discipline. Under the influence of the popularization of big data, data science turned out to be a promising business. And at the same time, the profession of data scientist became one of the most in-demand and highly paid in the world.

Today the term “data science” includes all methods of digitized information processing and database design. Some specialists consider the term “data science” to be the most adequate substitute for big data in terms of the sphere of activity and market niche [5].

4. “Data mining” is the intelligent analysis of data in order to identify certain patterns. Israeli mathematician Grigory Pyatetsky-Shapiro introduced this term in 1989.

Data mining is both a technology and a process of discovering previously unknown and practically useful knowledge in raw data [6]. Present time data mining methods are at the intersection of databases, statistics and artificial intelligence.

5. “Machine learning” is the theory and practice of developing self-learning programs, a large area of artificial intelligence. As we know, programmers teach their algorithms to identify general patterns from particular cases. As a re-

sult, the computer makes decisions based on its own experience rather than human commands. Therefore, many methods of such learning are related to datamining.

The first definition of machine learning was given back in 1959 by American computer scientist Arthur Samuel. In his time, he wrote a checkers game with artificial intelligence elements - one of the first self-learning programs in the world.

6. "Deep learning" is a type of machine learning that creates more complex and more independent learning programs.

As you know, in conventional machine learning, the computer extracts knowledge through guided experience: the programmer gives the algorithm examples and manually corrects errors. With deep learning, the system designs its own functions, makes multi-level calculations and draws conclusions about the surrounding world. Today, deep learning is already being applied to neural networks. Applications of this technology include image processing, speech recognition, neural machine translation, computational pharmaceuticals and other breakthrough technologies implemented by IT giants like Google, Facebook, Baidu and others. Deep learning has thus become one of the most in-demand areas of information technology today.

It is not known who first applied the term to neural networks. "Deep learning" became popular in 2007, when Canadian scientist Jeffrey Hinton created deep learning algorithms for multilayer neural networks.

7. "Artificial neural network" is a system of connected simple processors (artificial neurons) that mimics the human nervous system. Due to this structure, neural networks are not programmed, but trained. Like real neurons, processors simply receive signals and transmit them to their brethren. But the entire network is capable of performing complex tasks that traditional algorithms cannot cope with.

The very concept of artificial neural networks was introduced by American scientists Warren McCulloch and Walter Pitts back in 1943. Today, neural networks are used for pattern recognition, classification, prediction, neural network data compression and other practical tasks.

8. "Business intelligence" is the search for optimal business solutions by processing large amounts of unstructured data. Effective business intelligence analyzes external and internal data -

both market information and client company reports.

This gives a complete picture of the business and allows to make both operational and strategic decisions (to choose both the price of the product and the priorities of the company's development) [7].

The term appeared in 1958 in an article by IBM researcher Hans Peter Moon. In 1996, the analytical agency "Gartner", which specializes in studying the IT market, included business intelligence and datamining methodology.

Thus, from the above material, we can state that "Big Data" is a term that describes voluminous, complex and diverse data sets. They cannot be effectively processed using traditional methods. These data are characterized exclusively by the following parameters: volume (quantity), variety (what types there are) and velocity (how quickly they are created and accumulated).

It should be noted that Big Data analysis often requires specialized technologies, algorithms and computational resources, it helps to see hidden patterns that are invisible to the limited human perception [8]. And this gives unprecedented opportunities to optimize all spheres of our life: public administration, medicine, telecommunications, economics and finance, transportation, production, improves the efficiency and competitiveness of companies around the world, etc. [9].

Next, let's note again the main advantages of Big Data in modern economy. For example, analyzing large amounts of data:

- enables more informed decision-making by using factual data and statistics;
- identifies weaknesses in business processes, which helps reduce costs and increase productivity;
- helps companies better understand customer preferences. They can also learn more information by studying the actions of competitors. This leads to the development of effective marketing strategies;
- provides an opportunity to create personalized offers to customers. This increases the likelihood of repeat purchases;
- used as a tool for forecasting and managing risks. It helps prevent risks related to finance, logistics, production and other aspects of business;
- improves marketing and advertising. It can be used to accurately identify the target audience. It makes it easy to measure the effective-

ness of advertising campaigns and adapt marketing strategies in real time;

- improves product quality and customer service. This increases the number of loyal customers;

- creates new business models. It is used to create subscription services, recommendation systems and platforms for users;

- promotes innovation, allowing companies to conduct research and develop new products;

- countering fraud. Any anomalies and potential threats with this method are detected instantly.

Thus, the use of Big Data is more effective the more funds are invested in the development of technology and analytical skills of personnel. And this makes Big Data an important tool in the modern economy.

Finally, let's give some concrete examples of Big Data use in the modern economy:

1. Financial analysis. Risk assessment, forecasting changes in financial markets;

2. Marketing and advertising. Creation of effective marketing campaigns;

3. Forecasting demand for goods. Facilitates efficient product storage and inventory optimization;

4. Inventory management. Reduces storage costs;

5. Improved pricing. Determining optimal prices for goods and services;

6. Analysis of text data from social networks and media. Helps companies understand public opinion about their brand;

7. Weather forecasting. Creating more accurate weather forecasts, which is important for agriculture and logistics;

8. Combating fraud. Preventing the actions of con artists;

9. Health and medical diagnostics. Improved accuracy in analysis epidemics and morbidity;

10. Logistics. Reduces time delays for delivery;

11. Social Media Analysis. Analysis of users in social networks. Used to identify trends for services;

12. Public Administration. Officials can use Big Data to analyze population data, fight crime, and optimize government programs;

13. Manufacturing and IoT. Improving manufacturing processes and equipment maintenance;

14. Education. Development of per-

sonalized learning programs, prediction of student performance;

15. Energy. Optimization of energy consumption;

16. Market research. Development of strategic solutions;

17. Tourism and Hospitality. Providing personalized services that cater to customer sentiments;

18. Biotechnology and pharmaceuticals. Manufacturing new drugs and medical technologies;

19. Geographic data research. Solving problems in the fields of geology, ecology and urban planning;

20. Online shopping. Online shops analyze data on customer purchases and behavior. They use it to create personalized recommendations, improve user experience [4].

These examples demonstrate the variety of areas in which Big Data is already playing an important role. They support informed decision – making and optimize business processes [10].

Next, let's talk about the prospects for further development of Big Data in the modern economy. The prospects of Big Data development in the modern economy also look promising. With the emergence of new technologies and the growth of data volume, new areas of interest for scientists and businesses are emerging:

1. Industry 4.0 and the Internet of Things (IoT). It requires a huge amount of data collected from various devices to develop it. [11]. Big Data will allow this information to be analyzed to optimize the manufacturing process and supply chain management.

2. Artificial Intelligence (AI). Big Data and AI are interconnected.

The growing use of AI in the economy will be accompanied by more data to process, which will enable the creation of advanced intelligent solutions.

3. Development of cloud technologies. Cloud computing will allow you to scale the infrastructure for processing and storing data. This will make Big Data accessible from the financial and technical point of view.

4. Involvement of new industries. Big Data will play a more important role in all industries that previously made little or no use of big data. Agriculture, construction and retail can be mentioned here.

5. Combating security challenges. As the volume of data increases, ensuring of privacy

becomes critically important. The development of encryption, authentication and data protection methods will certainly continue to develop actively.

6. Data regulation. As the method grows in popularity, the role of regulation also increases. The issue of data protection will continue to attract the attention of company management and government services.

7. Development of processing methods. The emergence of new data analysis methods, including machine learning and deep learning, will facilitate accurate analytical decisions. These are the decisions that are difficult for a person to make on their own without knowledge of AI.

8. Strengthening long-term strategies. Big Data will allow you to create strategies based on forecasts.

9. Improved resource management. Using Big Data will allow you to effectively manage resources. This applies, among other things, to electricity, water and transport. [12]. It is important innovation from the point of view of environmental sustainability of territories.

10. Growing consumer interest. Users become more aware of their goals. They begin to appreciate the rules of confidentiality. This creates demand for companies that can ensure the protection of personal data.

Thus, Big Data continues to increase its influence and becomes a key element of the modern economy. And companies that can use big data effectively will have a competitive advantage. They will have more opportunities for growth.

Next, let's also highlight 5 promising trends in digital finance that are worth paying our close attention to. Here too (in digital finance), the prospects for Big Data are promising. As new technologies emerge and the volume of data grows, new areas of interest are emerging.

Currently, there are several distinct trends in digital finance that are shaping the landscape and development vector of this industry:

1. Open Banking

A fact that has already happened, today the provision of financial services is undergoing significant changes thanks to a revolutionary movement known as Open Banking. It involves the secure transfer of consumer financial data between financial institutions (with the permission/request of customers).

This sharing of data increases competition and enables the development of innovative financial products and services. Open Banking aims to increase financial transparency, improve customer experience and promote financial inclusion by offering consumers more personalized and tailored financial solutions.

It also encourages cooperation between financial institutions and fin-tech companies, leading to a more connected and efficient financial ecosystem. By giving the customer control over their data and facilitating the seamless exchange of data, Open Banking is contributing to the digital transformation of the financial industry [13].

2. Digital wallets and contactless payments.

These trends are rapidly gaining acceptance among financial services players as fast, secure and convenient alternatives to traditional payment methods. Thanks to the proliferation of mobile payment applications such as Apple Pay, Google Pay and Samsung Pay, among others, consumers can make purchases simply by touching their phones to terminals.

Also worth mentioning in this context is the fast-growing NFC technology, thanks to which small and medium-sized businesses can use smartphones as terminals to accept payments from customers for goods and services.

It should also be noted here that digital wallets reduce the risk of fraud while increasing convenience and security by replacing sensitive card data with encrypted tokens.

3. Block-chain technology and cryptocurrencies.

In recent years, cryptocurrencies such as Bitcoin and Ethereum have attracted a lot of attention. These digital assets are based on blockchains - decentralized networks that provide transparency, security and immutability. Although the use of cryptocurrencies for regular transactions is still in its infancy, they are poised to overturn established financial systems in the near future, enabling peer-to-peer transactions that are faster, cheaper and borderless in time and space.

In addition to cryptocurrencies, block-chain technology is also being used in areas such as supply chain management, identity verification and smart contracts. These programs increase the efficiency and transparency of many financial transactions.

4. Robotic advisors (consultants) and financial services based on artificial intelligence.

Robot-advisors are automated platforms that offer personalized financial planning and asset management services using algorithms and artificial intelligence. For example, they create customized investment portfolios for clients by analyzing a vast amount of data, including risk tolerance, financial goals and market patterns.

Robotic advisors appeal to tech-savvy investors who prefer a digital strategy, and they charge lower fees than regular human advisors. Other financial services, such as fraud detection, credit scoring, and chat-bot-based customer service, are now using AI-based solutions to streamline operations and improve the consumer experience.

5. Embedded finance.

Embedded finance is the integration of financial services into software and systems that are not financial in nature. This development enables companies in various sectors, including e-commerce, carsharing and retail, to provide financial goods and services to their customers [14].

For example, a ride-sharing service may provide users with access to insurance or micro-loans directly within the app, while an e-commerce platform may offer instalment payment options. By utilizing current user audiences and data, embedded finance allows companies to strengthen their value proposition, increase consumer engagement and develop new sources of their own and their customers' revenue streams [15].

And this is already, which is obvious in fact, begins to erase the differences between traditional financial institutions and other sectors of the economy, stimulating innovation and competition [16].

Thus, and we emphasize that nowadays the use of Big Data is a complex process in all branches of modern economy and finance. And the responsibility for it is assigned to various structures in organizations and companies. It is always very important to be able to ensure cooperation between managers within organizations and companies. It is very important that other employees at all levels of the management and decision-making process are properly trained in this method. In this way they will be able to understand how to use all this data in their work effectively and will be able to observe the rules of confidentiality better. In short, the successful implementation of

Big Data requires the concrete co-operation of various structures and individuals [17]. The general support of the management of organizations and companies will also play an important role.

Conclusions. The study we conducted and the data obtained allowed us to draw the following conclusions:

- Currently, and this can already be stated with confidence, the global volume of digitized information (Big Data) is growing exponentially. Fortunately, the world will be saved by Big Data processing technologies. They will allow people to embrace the vastness of the world and benefit from it.

- Since the early 2010s, Big Data science has ceased to be a purely academic discipline. And under the influence of the popularization of Big Data, data science turned out to be a promising business. And then the profession of data scientist became one of the most popular and highly paid in the world.

- Today, knowledge of Big Data is being applied to neural networks: image processing, speech recognition, neural machine translation, computational pharmaceuticals and other breakthrough technologies implemented by IT-giants (which become one of the most sought-after areas of information technology).

- The prospects for Big Data development in the modern economy also look promising. With the emergence of new technologies and the growth of data volume, new areas of interest to both scientists and businesses are emerging (it gives a complete picture of the business and allows to make both operational and strategic decisions).

- Today, there are several distinct trends in digital finance that are shaping the landscape and vector of development of this industry. And the process of rapid data exchange itself promotes competition and enables the development of innovative financial products and services, leading to a more interconnected and efficient financial ecosystem.

Thus, and we emphasize that the correct and timely analysis of the volume of digitized information (Big Data) requires specialized technologies, algorithms and computing resources. It also helps to see hidden patterns that are invisible to the limited human perception. This gives unprecedented opportunities to optimize all spheres of our life: public administration, medicine, telecommunications, economy and finance,

transport, production, growth of efficiency and competitiveness of companies all over the world, etc.

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Статья поступила 15 апреля 2024 г.