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METHODOLOGICAL ASPECTS OF STATISTICAL ANALYSIS OF THE DIGITAL ECONOMY IN UZBEKISTAN

Abstract: *This article proves that at present the formation of the digital economy has a complex impact on the development of industries and spheres of the economic system of Uzbekistan. In addition, an important task for the further socio-economic development of Uzbekistan within the framework of digitalization and the transition to an information society is to improve the quality of information interaction in various spheres of society, in connection with which issues related to the statistical assessment of the development of e-commerce, the definition of processes occurring in it as a subject of statistical research and the development of a system of statistical indicators become relevant.*

Key words: *digitalization of the economy, e-commerce, innovative technologies, integration of digital technologies, statistical assessment, knowledge economy, institutional infrastructure, interactive electronic services, statistical observation.*

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Introduction

The digitalization of the economy transforms the ways of delivery and consumption of goods and services, which in turn affects all spheres of human activity. The field of e-commerce is a relatively young area of statistical observation, so researchers, business representatives and other stakeholders currently lack statistical information, which, in turn, helps to study the economic, social and environmental consequences of the digitized world.

At present, experts agree that the current state of the economy represents a qualitatively new level of development of the public economy, in which the role of economic entities, the structure of the world economy, the essence of trade relations and public administration are changing [1]. Some experts call such a formation of the economy "post-industrial", "new", "innovative". They also resort to such names as the economy of knowledge, competencies, and network interaction. In recent years, the term "digital economy "has become more widely used in the scientific, government and business environment.

The distinctive features of the digital economy include improving the efficiency of economic processes, changing the structure of employment, redistributing the economic influence of countries on

the world market, and developing digital payment systems and electronic money. Along with the listed terms, the following also appear in the literature: "new technological way", "application economy", "creative economy".

The first works in the field of digital economy date back to the 90s of the last century. Many experts believe that the origin of the concept of digital economy is D. Tapscott, who in his book "Digital Economy" (1996) first described the system of a virtual economic system and described the essence of this phenomenon [2]. Other researchers as the primary source of the ideology of the digital economy call N. Negroponte, an American computer scientist, who in 1995 identified the main property of the economy of the new format-the virtuality of economic relations, electronic commerce.

Artificial intelligence technologies "provides that in accordance with the Strategy" Digital Uzbekistan – 2030" and in order to create favorable conditions for the accelerated introduction of artificial intelligence technologies and their wide application in the country, to ensure the availability and high quality of digital data, to train qualified personnel in this area, to approve a program of measures for the study and implementation of artificial intelligence technologies in 2021-2022 years, as well as a list of pilot projects for the introduction of artificial intelligence technologies implemented in 2021-2022 years, including with the involvement of residents of the Technological Park of Software Products and information Technologies [3-9].

The term "big data" is not new, but it began to acquire its true meaning only in the last few years, when technologies such as the Internet of Things, cloud services, peripheral computing and a number of others began to develop rapidly. They are the ones that contribute to the spasmodic growth of the data volume. Even a decade ago, this was considered a serious problem, but now organizations that experiment and implement machine learning (ML) and other types of artificial intelligence (AI) see big data as a boon for business.

AI and ML provide new opportunities to rediscover the value of big data, as well as to find new applications in view of the emergence of new types of data. Now we have much more useful data in the form of images, videos, and voice, for example. In the past, we tried to minimize the amount of this type of data we collected, because we didn't know how to get the most out of it, and it was expensive to store it.

There is a direct relationship between big data and AI: the latter is largely dependent on the success of the former technology, and it also helps organizations unlock the potential of their stored data through tools that were previously either very cumbersome or did not exist in principle. Today, we want to get as much data as possible, which is useful not only for better understanding of business problems, but also because the more data we enter into machine learning models, the better they become.

Despite significant progress, big data technology and analytics have not gotten rid of storage problems and a number of other complexities. In some cases, the combination of big data and AI creates new needs (or highlights existing ones), such as infrastructure, data preparation, and management, while in others it can be a key tool for solving an organization's operational problems.

Below are the main areas where the best ideas are fueled [10-18].

1. Creates new methods of data analysis. One of the fundamental business problems of big data boils down to a simple question: what should I do with them? What value can be obtained from the accumulation of huge amounts of information that the company already has and which will continue to be replenished in the future? As you know, it has always taken a lot of manual labor to extract value from data, but with the advent of AI and ML, this task will become easier.

Historically, when analyzing data, engineers had to use queries or SQL (query lists). But as the importance of data continues to grow, there are many ways to get a better understanding of it. AI is the next step in the development of SQL, what used to be statistical models have now merged with computer science and become AI and ML.

2. Data analytics becomes less time-consuming. The advent of machine models significantly reduced the number of time-consuming manual processes that were required to manage and analyze data. Thanks to them, data processing time that took days or weeks (or longer) has been reduced to hours, but people still play a vital role. AI and ML are tools that help companies analyze their data faster and more efficiently than only employees can do. In other words, AI encourages ideas and speeds up decision-making. Moreover, IT professionals can act in a similar way, using AI to reduce time-consuming manual procedures and speed up the maintenance of an organization's internal infrastructure. The nature of data analysis requires that it be performed in real time. Taking into account the fact that data is widely distributed across different data centers, regions, and clouds, companies are forced to move away from traditional methods of data management and analysis. The arrival of AI changes the rules of the game. Gone are the days when data engineers manually copied them multiple times, providing data sets to analysts' weeks after they requested them.

3. People still play an important role. Like other emerging technologies, AI and ML are critical to helping businesses build a more holistic view of the data world around them, enabling them to make connections between key data sets. Businesses need to combine the power of human intuition with AI to expand its capabilities. After all, in order to function

and fulfill its mission, an AI system must learn from the data that comes from humans.

Companies that successfully combine human and technology capabilities can expand access to key analytical data without the help of data scientists and business analysts, saving time and reducing the potential bias that can arise from the interpretation of data by business users. This leads to more efficient business operations, faster data understanding, and ultimately, improved enterprise productivity.

4. AI/ML will smooth out common data problems. Technologies change, and new ones appear from year to year, but one thing remains the same: the value of data is inextricably linked to its quality. Low quality means low value or no value at all. This is what combines big data with AI. "Every conversation about machine learning always comes back to the quality of the company's data. If the data is "dirty", the conclusions obtained from it cannot be trusted. Data cleaning has always been a stumbling block for analytical calculations, but perhaps a solution will soon come. The data for the ML can be cleared using the ML himself. DOD algorithms can detect extraneous and missing values, find duplicate records that describe the same object with slightly different terminology, normalize data for common terminology, and so on.

5. Analytics become more predictive and prescriptive. Big data analytics is the process of analyzing large and complex data sources to identify trends, customer behaviors, and market preferences, which help you, make better business decisions. The complexity of big data analysis requires new analytical tools, such as predictive analytics, machine learning, streaming analytics, and techniques such as in-database and in-cluster analysis.

In the past, data analytics was based on events that had already passed ("what happened"), and forecasts for the future were made based on historical data. AI and ML are opening up a new front: "What's going to happen" (or at least "what's likely to happen"). Moreover, the ML algorithm can be taught to make decisions or take actions based on predictive information. Today, and moves big data-related solutions to points precisely located on the timeline, using predictive analytics. These decisions were usually based on data that was obtained in the past and present, which usually led to a linear return on investment. The decisions made with AI input have taken on epic and exponential proportions. Prescriptive analytics is based on and has the potential to bring data-driven insights into company-wide strategies that drive business development.

To date, approaches to the statistical assessment of the development of the digital economy have already been formed. The objects of research of information society statistics are the Internet penetration, the parameters of the development of technological infrastructure and access to it, the intensity of the use of information and communication technologies (ICTs), human capital, the direct and indirect impact of the Internet on the economy and social sphere [19-20].

As a tool for assessing the state of digitalization in the world, the DESI (Digital Economy and Society) index takes into account 5 main groups of indicators: telecommunications, human capital, the use of Internet networks, the integration of digital technologies, and digital public services. Along with this index, there is the ICT Development Index (IDI), which is an integral indicator that includes 11 indicators that characterize access to ICT, the use of ICT and practical skills in the field of ICT.

Some experts depart from the already traditional approaches to measuring the development of the information society and consider the Internet economy as an object of statistical analysis, describing the methodology for calculating the contribution of the Internet to the economy, classification of economic activities of the Internet economy, sources of information for data collection. The calculation of the direct impact of the Internet is based on the system of national accounts and methods for calculating the gross domestic product [3]. They argue that in the conditions of modern society, a significant role in the development of e-commerce is played by the state, which sets the vector for the development of certain industries and coordinates the integration of certain technologies into these industries, develops a regulatory system of new economic relations, and also performs statistical monitoring of digital objects.

The formation of the digital economy on an international scale has a complex impact on the development of industries and spheres of the world economic system, including in the Republic of Uzbekistan. In the modern period in the statistical industry of the Republic of Uzbekistan, a large number of statistical calculations and forecasts are carried out on the basis of the use of advanced ICT, there is experience in organizing interaction between information systems (IS) operating in the State Committee of the Republic of Uzbekistan on Statistics.

An analysis of the main indicators of the development of the ICT sector in the Republic of Uzbekistan over the past three years shows that every year there is an increase in the number of interactive services, software is being developed\, communication and information services are being improved. As practice shows, the development of digital technologies contributes to the growth of the efficiency of the functioning of industries and spheres of the national economy.

Data from the State Statistics Committee of the Republic of Uzbekistan show that in the first nine months of 2020 year, the share of communication and information services in the total volume of market

services increased compared to the same period in 2019 year and amounted to 6.0% [5].

At the same time, it should be noted that the digitalization of the national economy requires new approaches to the integration of information systems of various departments in a single information space using a corporate portal. Through the corporate portal, the work of special web services recently developed in the State Committee of the Republic of Uzbekistan on Statistics is carried out.

For example, such as the Web service "Permanent population". This service informs the site visitors about the current population registration in the online mode. At the same time, taking into account the requests of the subjects of the national economy, a web service "Electronic Store" has been developed, which allows any economic entity to purchase the necessary statistical collection using advanced ICT.

Technologies for working with web services are built on the principle of openness, transparency and integration of information systems in order to provide high-quality information services to any user who has the skills to work with a website and the Internet.

Special sections on the corporate portal of the State Committee of the Republic of Uzbekistan on Statistics are devoted to Open Data, the upcoming population census in 2022 year, the Sustainable Development Goals, a multi-indicator cluster survey in the Republic of Uzbekistan in 2020-2021 years, etc. According to statistics, new information systems have been developed and are being put into operation in the Republic of Uzbekistan. Thus, the information system "Consumer Price Index Calculator" has been developed to calculate the overall change in the consumer price index (CPI) for a certain period of time and is designed to operate online. The following system, which developed and implemented in the State Committee of the Republic of Uzbekistan on Statistics in a pilot version is an information system based on the use of observation tracking technology using tablets - CAPI technology (Computer Assisted Personal Interviewing).

It is also symbolic that 2020 year in the Republic of Uzbekistan has been declared the Year of the Development of Science, Education and the Digital Economy. The state program, adopted within the framework of the Year of Development of Science, Education and the Digital Economy, provides for the implementation in the current year of the large-scale tasks designated by the head of the republic. Today information and communication technologies occupy an important place in the development of the republic. The work carried out in previous years by the leadership of the Republic of Uzbekistan on the widespread introduction and development of information and communication technologies is already bearing fruit. If we turn to economic indicators, then 2019 year can be characterized as positive. The total volume of provided ICT services reached 104 percent. The volume of services in the field of communications and informatization increased to 130%. In addition, the following other important indicators can be cited

The volume of computer and software services in 2019 year increased by 119%;

• Exports of software products and services grew to $15.8 million, or 158% (according to the plan is $10 million);

• The amount of remuneration in the field of information and communication technologies also increased significantly.

• The number of enterprises with the participation of foreign capital is also consistently growing: at the end of 2019 year, their number amounted to 269 units (increased by 73 units). In 2019 year, the Ministry implemented 9 large projects totaling $177.5 million in accordance with the projects included in the Investment Program. Moreover, the plan was over fulfilled by 102% (according to the plan - $174.02 million). In particular:

• Based on direct foreign investments - projects worth $97.14 million (according to the plan - $94.5 million, growth dynamics – 103%);

• On the basis of foreign loans secured by the state - projects in the amount of $53.38 million (according to the plan - $43.56 million, growth dynamics – 123%.

At the expense of the enterprises' own funds - projects worth $26.93 million (according to the plan - $35.96 million, the volume was fulfilled by 75%). In the 2019 year, work was done in the ICT field in a number of important areas. By registering websites in the national segment of the Internet under the “UZ” domain, work has been established to provide beneficial services for consumers receive knowledge by young people online and provide services to the population through electronic services. Also, fruitful work was done in the field of online payment: for example, in 2019 year, 299.3 million transactions were carried out through online payment systems. In order to develop contactless forms of communication between the population and entrepreneurs, on the one hand, and government agencies, on the other hand, a new version of the Unified Interactive Portal of Public Services was developed. Today, 176 types of electronic state services are provided through the Single Portal 15.1 million applications have been received. This, in turn, makes it possible to significantly reduce the costs and time of the population. More than 4.4 thousand state bodies and organizations and over 30 thousand users are currently connected to the Unified Interdepartmental Electronic System of Performing Discipline.

In 2019 year, work was also carried out to develop the telecommunications infrastructure. Thus, the total bandwidth in the international Internet network reached 1.200 Gbit/s, and through the switching centers the speed reached 750 Gbit/s. Thus,

the download throughput increased by 76.6%. And since January 1, 2020 year, tariffs for operators and providers for Internet services have been reduced by 34%, the number of Internet users has grown to 22 million, including 19 million mobile Internet users. Backbone telecommunications were expanded at 237 objects across the republic, telecommunications equipment was modernized.

Thus, the throughput of backbone telecommunications in the regions is 200 Gbit/s, in the regions is 40 Gbit/s. Also, during the implementation of the project for the construction of fiber-optic communication lines 10.0 thousand kilometers of fiber-optic lines were erected, and thus their total length is 36.6 thousand kilometers. With the aim of developing mobile communication networks, 2.017 mobile base stations were installed. Thus, their total number exceeded 26 thousand, and the coverage of the population with mobile communications reached 96%, and the level of coverage with broadband communications to the mobile Internet network reached 70%. In the course of the implementation of work on expanding the coverage of connection to broadband communications by operators and providers, 786 thousand ports were installed, and thus the total number of ports for connecting to broadband Internet reached 1.9 million pieces.

In order to increase the attractiveness of service, tourism, trade and catering facilities by business entities, telecommunications operators and providers in public places, places of pilgrimage, railway stations, airports, tourist sites, as well as at all facilities of the Tashkent metro, over 685 thousand Wi-Fi points have been installed. The emergence of digital technologies is closely related to the emergence of a huge number of different sources of information. The data generated by the digital economy, in terms of their scale, variety, nature of occurrence and complexity, require adequate statistical accounting. However, at the moment, international statistical organizations recognize the inability of the modern statistical apparatus to describe all the visible and expected consequences of the transformation of society. In this case, the current model of the functioning of official statistics as a type of state activity, such as lawmaking, lags significantly behind the actual trends. The underdevelopment of statistics acts as a barrier to the development of the digital economy. This is due to the fact that all interested parties cannot get an adequate picture of what is happening, which, as you know, has a negative effect on further development.

But in contrast to this opinion, a number of objective arguments should be made in favor of the fact that international statistical organizations are making every possible effort at the moment in order to adapt the system of statistical indicators to adequately reflect the current situation. First, the theoretical framework and methodology of information society statistics - the forerunner of digital economy statistics - is a well-developed tool for reflecting trends in modern processes. Secondly, within the conceptual framework of the current model of statistical observation, it is already possible to collect data on new digital phenomena. Third, the adaptation of the statistical infrastructure - a critical element in the development of statistical accounting for the impact of the new economic system - is on the agenda not only of many international statistical organizations, but also of national statistical offices.

The latter factor, in turn, is an important tool for national statistical organizations to generate meaningful statistics that will help policymakers, businesses and the public assess the impact that digitalization has on the economy and society as a whole. Based on the review of the definitions of the digital economy, we can conclude that the term "digital economy" is put forward primarily in order to try to cover the issues and problems that have arisen in the field of interaction and exchange of goods and services between consumers and producers in the market of goods and services. Although the term has gained popularity, no definition has yet been proposed that demonstrates the true role of what is meant by the digital economy. It is unclear whether such a definition will ever be proposed, in part because the phenomena of the digital economy are pervasive - it is not so much a part or a sector or a branch of the economy, but a transformation of the entire economic system and, as a consequence, of public life. Accordingly, it is more appropriate to refer to the “digital model of the economy” rather than the “digital economy”. Electronic commerce, in turn, includes trade and financial transactions carried out through electronic networks.

E-commerce is one of the most powerful engines for technology development and international business. There is no doubt that the conditions created by the digital economy are transformative. These changes are in the way a product or service is produced, delivered and consumed in an increasingly digital marketplace. The very essence of e-commerce contributes to the reduction of distances, as it blurs the boundaries and helps to establish connections between anywhere in the world. At the same time, issues of intercultural communication, culture of information consumption, business principles in different countries remain open and will always be relevant. Building a business over the Internet requires well-designed and effective privacy solutions. One way is to use certification, access authorization. Thanks to new technologies, innovations and social trends, the digitalization of the economy is changing the behavior model of economic agents. While end products have not changed much, digital technology and new business models are changing the way we deliver and consumer goods and services.

At the same time, it is important to emphasize that in reality only the behavior model of market participants is changing, while economic benefits by themselves do not change their essence. The term "analog", which is common in popular literature, is appropriate here, as opposed to the term "digital". Most of the new innovative products remain “analog”, and the emergence of “digital” services is a normal process of market development. Hence, it is important to emphasize that the main task of statistics is to describe the qualitative changes taking place both in the economy and in society. And if such a role of statistics has always been assigned to it throughout its centuries-old history, then in the modern world this task is becoming much more difficult to solve. First of all, due to the fact that many socio-economic sciences, faced with the new digital world, are unable to describe some new phenomena and form a point of view on the facts of digital transformation. There is undoubtedly tremendous value in entirely new data, as evidenced by the emergence of new products and services, as well as the growing concern of policymakers about the impact that digitalization is having on society.

As more and more businesses in various industries use new digital technologies, the economy is becoming more digitalized. Online shopping and e-commerce are the main channels for consumption, and the products themselves are moving from physical media (CDs, videos, books) to digital ones. With the proliferation of digital end-to-end platforms, the participants in online transactions are also changing. Whereas previously there were two main actors in any transaction, online transactions increasingly involve multiple actors: the entity that processes payments between buyers and sellers, the entity that distributes final products, and so on. We can say that the main distinguishing feature of the digital economy is the widespread penetration of information and communication technologies in the economic sector, the public sphere and public administration. Experts agree that the task of successful development of the digital economy belongs to the state, which is assigned the role of coordinator for the introduction of advanced technologies. At the moment, many countries are concentrating their efforts on state regulation of the development of the digital economy and e-commerce. According to various estimates, the leaders in the development of the digital economy in the world are China, the United States, the United Kingdom, South Korea, Denmark, the Netherlands, Sweden, Norway, Germany and Japan. Despite the initiation of state strategies for the development of the digital economy in Uzbekistan, the preconditions for the transition to a new format economy have not yet been fully formed. Lack of institutional infrastructure, significant digital inequality, insufficient level of information security, shortcomings in the system of training qualified personnel are highlighted among the main barriers preventing the development of the digital economy in the Republic of Uzbekistan. At the moment, the task of determining specific steps to accelerate the digitalization of society remains relevant - which technologies and how should be applied, what are the factors for the effective development of the digital sphere and the sphere of e-commerce, to what extent the development of the digital economy spheres in the Republic is ensured. For the effective development of e-commerce, the following main factors can be indicated: the development of ICT infrastructure, interactive communities, information resources, knowledge bases, digital environment, new forms of electronic interaction, and platforms for integrating business, government and society.

For the successful development of the digital economy in the Republic of Uzbekistan within the framework of the state strategy "Digital Uzbekistan - 2030" it is necessary to ensure: the development of state, socially significant online services; transition to digital technologies of state bodies and departments; the development of the Internet of Things in the consumer sector and in industry; creation of domestic software, modern ICT for the purpose of import substitution. At the same time, it should be emphasized that at the moment these tasks are partially being solved, however, their final implementation is possible only after determining the sectors of the economy for the implementation of individual digital solutions and the development of target indicators characterizing the effectiveness of the implementation of the selected technologies in certain industries.

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