

DEVELOPMENT OF "SMART CITIES" AND "INTERNET OF THINGS" TECHNOLOGY IN UZBEKISTAN.

Narzullaeva Durdona Kuisunovna,

senior teacher Tashkent branch of Russian economic university after G.V. Plekhanov.

Shermukhamedov Abbas Tairovich,

doctor of physical and mathematical sciences, professor, Tashkent branch of Russian economic university after G.V. Plekhanov

Abdullaeva Dilora Kuysunovna,

Associate Professor, Candidate of Economic Sciences, Tashkent State University of Economics.

Abstract. The Internet of Things is a powerful lever of influence on our society, the labor market and the success of companies. And whatever the organization's business model, you need to follow a basic set of solutions that fully satisfy the IoT tasks: understanding the strategy, regulating processes, correct device management protocols, collecting and analyzing information, protecting it and having storage.

Key words: Internet, things, infrastructure, technology, advantages, companies, implementation, use, business, consumer.

Introduction. Our world is global and digitally hyper-connected: a world of big data, process automation, digital logistics and personalization on both the supply and demand side.

One of the key global trends is the rapid development of information digital technologies, partly provoked by the spread of the covid pandemic. IT infrastructure has become crucial for a competitive business, a socially stable society and an efficient state.

Digitalization is the main focus of many countries — Germany, China, Japan, the USA, etc. For example, Germany — the ancestor of the industry 4.0 concept — will soon spend €5 billion on developments in the field of artificial intelligence, China plans to invest about 1,4 trillion dollars in information technology by the end of 2025.

Traceability technologies, digital twins, unmanned vehicles (AI) in hazardous areas, smart sensors make it possible to accumulate big data, model and predict complex, unstructured processes.

Research methods: The research methodology consists of their analysis, synthesis of various sources for the development of Internet of Things technologies in Uzbekistan.

Discussion. The world community has chosen a new vector of development. This vector can be called as the synergy of the digital and physical worlds - the technology of the "Internet of Things". Countries with developed economies have taken this direction to stimulate regional strategies for the development of wireless devices over the Internet. A large number of multinational corporations attract significant financial resources by investing in the latest developments in the

field of the Internet of things. The Internet of Things is also attractive for small and medium-sized businesses.

Currently, scientific research of the global community is aimed at understanding the phenomenon in the context of:

- On the definitions of the term "Internet of Things" and descriptions of various technologies of the Internet of Things;
- determining the qualitative and quantitative benefits associated with the implementation of Internet of Things technologies at the global and regional levels;
- analysis of the conditions conducive to the spread of Internet of things technologies at the regional and local levels;
- to study the risks and threats that prevent the widespread use of Internet of things technologies;
- to identify technological problems in the implementation of the Internet of things in different regions;
- to ensure the information security of the Internet of Things; on the analysis of the legal regulation of relations related to the use of Internet of things technologies.

The Internet of Things is an area for studying and building ecosystems like "Smart Home" or those that Apple is currently releasing. Such technologies are changing the life of a person - they bring convenience, innovation and a different approach to the use of electrical appliances.

- The global community has spent 1.2 trillion dollars on the Internet of Things by 2022;
- China has been investing 300 billion dollars in the Internet of Things since 2017;
- Internet of Things creates new jobs - 300 million programmers were in demand in 2021.

Currently, many countries are paying attention to the formation of policies in the field of technologies of the "Internet of Things". In the United States in 2016, it was decided to develop a national strategy for the Internet of things. South Korea approved the "Internet of Things Master Plan" in 2014. Japan adopted the "Japan Growth Strategy" in 2016, which provides for the development of Industry 4.0, the Internet of Things, Big Data. The PRC has completed the state program for the development of the Internet of Things until 2020 (adopted in 2017). The concept of sustainable development involves the introduction of the Internet of things, Big Data, smart city technologies (Smart City) into the global economy.

"The Internet of Things integrates the connection between human culture with the use of things in the interconnection of a digital information system-" the Internet"-said Kevin Ashton, the creator of the technology.

The Internet of Things has enabled the creation of dynamic networks of billions and trillions of such things communicating with each other. The simplest explanation of what IoT is sounds like this: it is a network in which not users but devices communicate with each other.

Thus, there has been a fusion of the digital and physical worlds, for which applications, services, middleware components and end devices are things. Each of the things of the real physical world in IoT will have a digital twin, its virtual representation (Fig. 1).



Fig. 1 Scheme of interaction of elements of the «Internet of Things» technology.

These digital analogues will be able to perceive information from the outside world, interact, and exchange data. As a result, a completely new environment will emerge, where the intelligence embedded in applications will allow you to evaluate what is happening in the physical world, take into account previously accumulated information and experience to support decision-making. In such an environment, qualitatively new conditions are created for business, for health protection, for ensuring environmental safety and everything else that surrounds us.

Of course, this whole process does not exclude a person, and as proof of this, one can cite the disappointing conclusion that the creators of the Google self-driving car came to after a series of experiments, they consider the result to be negative, since it will not be possible to do without a driver for the foreseeable future, moreover, the level of automation already today it is time to limit it, not bringing it to the point where a person loses a sense of responsibility for what is happening.

The IoT is not supposed to make things completely autonomous, because it is human-centric and gives him the ability to access things, although many things may behave differently than we imagine today. In IoT, each thing will have its own unique identifier or virtual identifier which together form a continuum of things that can address each other, creating temporary or permanent networks. Things will be able to participate in the process of their movement, reporting information about themselves, they will allow you to fully automate the logistics process, and having built-in intelligence, they will be able to change their properties and adapt to the environment, including to reduce energy consumption.

This platform is a single system with separate management, monitoring and crisis detection. It includes tools for collecting information through video cameras and sensors, a "cloud" matrix for processing "big data" and a command post with visualization. The intelligent system uses communication between the main services, video transmission from a place in space, location of

nearby patrols, flow accounting, traffic control, vehicle inspection. All data flows depending on the decision center.

One of the elements of the "Safe City" system has already been implemented in Tashkent: "smart" video surveillance cameras are operating at 120 intersections, fixing violations. Information from the cameras is transmitted to the crime monitoring center, which was launched in July 2017. This project has completely covered Tashkent and is being implemented in the regions, in particular, in Fergana and Samarkand. Further development of the software complex is carried out by the Center for Information Security and Assistance in Ensuring Public Order. The post of Deputy Minister for ICT Development, responsible for the implementation of Safe City projects, has been created.[1]

The complex is integrated with information systems of government agencies, video surveillance systems, analytics sensors, data processing centers. A unified dispatching service is being created for the Ministry of Internal Affairs, the Ministry of Emergency Situations, ambulance, fire safety, which receives calls to the number 112 and signals from SOS buttons. All incidents recorded by sensors and video cameras are reflected in the situational center, thanks to which the state of security in the capital is analyzed on an interactive map online. Also in Tashkent, an analytical video surveillance system has been introduced in public transport and parking lots with online payment and a car number recognition system are being created.

Thus, a "smart" city in Uzbekistan is a single system with a center for managing, monitoring and responding to crisis situations. The implementation of the planned measures for the development of "smart" cities in Uzbekistan will lead to an increase in the level of security of the population, a decrease in the level of crime, an increase in the country's tourism potential, an improvement in its investment climate and the quality of services provided by the state.

In 2021, online negotiations were held between the Institute of Physics and Technology and the Institute of Materials Science of the Academy of Sciences of the Republic of Uzbekistan with representatives of DK Ecofarm Co., Ltd. (The Republic of Korea). DK Ecofarm is one of the leading companies in the implementation of the Smart Farming system in the Republic of Korea.

The purpose of the online negotiations was to establish close cooperation for the joint development and implementation of smart farming technologies in Uzbekistan using renewable energy sources, semiconductor sensors and Internet of Things technologies, as well as the joint implementation of projects related to the commercialization of these technologies.

As a result of negotiations, a memorandum of cooperation was signed between the Institute of Physics and Technology and the Institute of Materials Science of the Academy of Sciences of the Republic of Uzbekistan with DK Ecofarm Co., Ltd. (The Republic of Korea).

In accordance with the agreement, the parties will cooperate in the development of smart agriculture technologies in Uzbekistan and a number of other related areas. It should be noted that building a digital economy involves the introduction of information technologies in all sectors of the economy, including agriculture, which is one of the key industries for Uzbekistan. Therefore, the main direction of cooperation with DK Ecofarm Co., Ltd. there will be a joint development and practical application of a set of technical solutions and robotic intelligent technologies for

growing agricultural products in closed systems (“Smart Greenhouses”) based on the use of the Internet of things and renewable energy sources, as well as semiconductor sensors.

The practical application of these technologies can reduce production costs in agriculture and significantly increase productivity and crop yields.

The Internet of Things is a major global market that is expanding year on year. Different analytical agencies give different forecasts for the development of the Internet of Things, but they are all confident that the future is promising. For example, Juniper Research anticipates that the bulk of the predicted positive growth dynamics of the Internet of Things systems will be provided by business customers, in particular retail, agro-industrial sector, companies associated with building smart homes and smart grids. Studies have shown that between 2017- and 2021-years Compound percent compound annual growth rate (CAGR) in the global IoT market was 14.4%. IoT spending reached \$1.1 trillion in 2021.

At the same time, two-thirds of the devices are located in China, North America and Western Europe. A new study by Juniper Research has shown that global IoT connections will increase from 17.7 billion in 2021 to 28 billion in 2025, a growth rate of 107%.

It is important to note that the effective development of IoT comes down not only to the penetration of "connected" devices into all aspects of human life, but to the creation of a technological ecosystem that combines technologies for collecting, transmitting, aggregating data on a platform that allows you to process data and use them to implement effective solutions.

The Internet of Things hides enormous potential, but it will only be revealed through the interaction of separate networks deployed to solve individual problems. Although historically IoT solutions were used mainly as elements of disparate systems, more and more complex solutions are now appearing on the market.

According to IDC, the total global investment in IoT-based solutions was 737 billion dollars in 2016, more than 800 billion dollars in 2017, and by 2021, investments have grown to approximately 1.4 trillion dollars. The market value of the Industrial Internet of Things by 2025 will come from software acquisition costs, reaching 216 billion dollars. [3]

For wireless data transmission, and, therefore, the effectiveness of the implementation of the Internet of things, such factors as productivity at low speeds, fault tolerance, and adaptability are paramount. Here, the catalysts were primarily the high level and standard of NB-IoT for building the Internet of things, adopted by the world community, whose development and distribution led to an increase in the number and decrease in the cost of IoT devices. The income from the Internet of Things industry amounted to 450 billion dollars in 2020. (Figure 4)

PWC experts determined that, in general, the development of IoT became real thanks to technological trends driven by both the state and business:

First, the rapid increase in the number of sensors and connected devices; reduction in the cost of data transmission, which made it possible to redirect investments into large processing systems;

Secondly, the development of cloud technologies and which provide a flexible system for storing and analyzing data in the face of a constant increase in the amount of data;

Third, reducing the cost of computing power, memory processors and storage systems.

Technologies and Platforms of “The Internet of Things” is a new technology that promises to revolutionize areas such as transportation, marketing, hospitality and more. The basic rule of the “Internet of things” is that these devices are autonomous and act together, for the benefit of a person. The common information space and the way things “communicate” with each other is the Internet.

Manufacturers add sensors to the components of their products so they can feed back data about how the products are being used. This can help companies identify product consumption and use problems, as well as monitor customer preferences in marketing. Companies can also use the data captured by these sensors to make their systems and their supply chains more efficient.[4]

The main advantage of the Internet of Things for business depends on the specific area. The key is that businesses can have access to more data about their products and their own internal systems, and be able to make changes as a result of that information.

“By implementing comprehensive real-time data collection and analysis, manufacturing systems can become significantly more responsive,” says McKinsey consultants.

A group of analysts said that while consumer spending on IoT devices was about 725 billion dollars, companies' spending on IoT reached 964 billion dollars. In 2020, business and consumer spending on IoT equipment reached about 3 trillion dollars. This statistic shows that consumers are buying more devices, but businesses are spending even more on production and distribution.[4]

As of 2020, there are over 620 IoT platforms and this number is predicted to grow in the future. It is predicted that by 2025-2030 there will be from 38.6 billion to 50 billion IoT devices in the world, respectively.

The two largest markets for IoT technologies will be healthcare, manufacturing and transportation. Two industries will benefit the most from these devices: healthcare with 30.3% of the market and manufacturing with 40.2% of the market. The IoT segment is rapidly growing in the healthcare industry, especially in terms of online health monitoring, rehabilitation assistance, and tracking the safety of medicines. Now that wearable sensors that are compact and do not require recharging for many months are able to measure activity, duration and quality of sleep, breathing, pressure, pulse, real-time tracking of physical condition will become the foundation for quality treatment programs and health maintenance, and in 2020 led to an increase in the total market value of smart health care to 169.3 billion dollars. According to analysts at Vodafone, the integration of technologies such as cloud services and IoT will make the healthcare industry more efficient and save up to 290 billion dollars in the medium term only due to the fact that the recommendations of doctors will be followed by patients much more carefully.

According to data from IDC, the three areas expected to spend more on the Internet of Things are manufacturing (189 billion dollars), transportation (85 billion dollars) and utilities (73 billion dollars). Manufacturers are heavily focused on process efficiency and asset tracking. At the same time, two-thirds of transport-related costs will be spent on cargo monitoring and rolling stock management.

The utility industry will be dominated by spending on smart grids, as well as gas and water supply networks. IDC predicts growth in spending on cross-industry areas of the Internet of Things, such as vehicle connectivity and smart homes.

If the Internet of Things is implemented throughout the supply chain, and not just in individual companies, then its impact can be even greater both on the timely delivery of materials and on the entire production management process. Increasing productivity or saving costs are two potential goals. At the same time, the Internet of Things can also create new revenue streams for businesses. Instead of just selling a standalone product like an engine, manufacturers can also sell predictive engine maintenance.

Enterprise use of the Internet of Things can be divided into two segments: industry offerings such as sensors in a generator set or real-time devices for healthcare. The second category is IoT devices that can be used in all industries, such as air conditioning and security.

It is important to note that the “Internet of Things” in business is not just a tribute to the trend of digital technologies, but an investment in an evolutionary management model for running and promoting a company.

On December 23, 2021, Oracle and Transform Insights released the results of a social study of companies implementing Internet of Things (IoT) technologies that showed a growing need for ready-made services. The majority of responsible decisions decide to give preference to a comprehensive proposal, not custom, private development - this opinion is shared by 64% of respondents. Moreover, 75% of survey participants would like smart device connectivity issues to be resolved by product vendors, and 70% would also like to have analytics and data tools along with an IoT solution.

Table 1

Focus programs for the development of the Internet of Things (IoT)

Activity Profile	World Companies
End product manufacturers	Apple, Google, Fitbit, Samsung, LG, HTC, Xiaomi, Samsung, Teslawatch, Cubic, Healbe, Wellink Dropcam (Google), Sony, Electrolux, Audi, Ford, BMW, General Technologies, Скаут, Даджет, Motors, Fiat, Mercedes
Producers of means	GE, IBM, Rockwell, Fanuc, ABB, Kawasaki, Kuka
Network Device Manufacturers	Alcatel Lucent, Juniper Networks, NSG, TP-Link, Эвика, «Док» Cisco, Nokia, Ericsson, Sonus Networks
Network operators	BT, Softbank, AT&T Telefonica, Level 3, Verizon, NTT, Vodafone, MTC, Ростелеком, Мерафон, Bharti Airtel, KDDI, China Mobile, MTN Group, China Telecom, ВымпелКом,

	ТрансТелеКом, Orange, Deutsche Telekom, SingTel
IT companies	Amazon, IBM, Google, Microsoft, Oracle, SAP, Citrix Systems, Red HКК, Синтроникс, IBS, Ланит, Нат, Informatica, Vmware, Brocade Comms, HP, Huawei
Operators of electronic platforms E-commerce	Alibaba, Amazon, Paypal
Social networks	Google, Facebook, Microsoft, Twitter, Baidu
Engineering companies and integrators of turnkey solutions.	Citrix Systems, Red Hat, Information Builders, SAS, Informatica, Vmware, MobileIron, Teradata

Thus, the desire of corporate customers to more advanced in the implementation of IoT technologies allows faster use of business results.

The Transform Insights also showed a change in the models of real IoT providers. Peculiarities of phantomization and product offerings are showing signs of manifestation, because providers are positioning themselves as sellers of “ready-made solutions”. Correspondingly, 56% of the respondents among the responsible persons of customers note that they tend to choose one of these specialists to work with IoT instead of contacting a system integrator.

Benefits of the Internet of Things for Consumers. Almost any physical object can be transformed into an Internet of Things (IoT) device if it can be connected to the Internet and controlled using the Internet. The Internet of Things is an innovation that has made it possible to connect electrical appliances, household appliances and equipment to the Internet. Now the device can be combined into a single network, controlled by a person.

Modern affairs promise to make our environment – our homes, offices and vehicles – smarter, more measurable and more communicable. Smart speakers or smart displays (check out the Google Nest Hub Max smart display) make it easy to play music, set timers, or get information. Security systems make it easier to see what's going on inside and out, or to see and communicate with visitors. However, smart thermostats can help us warm up our homes before we go back. Smart light bulbs can help pretend we're keeping at home, even when we're outside.

For consumers, the smart home is the home where they come into contact with the internet of things. This is one of the industries where big technology companies (Amazon, Google and Apple in particular) interact with each other.

The most interesting of the devices are smart speakers (or smart displays), as well as smart plugs, light bulbs, cameras, thermostats, and smart home refrigerators.

But besides the simple interest in the shiny new gadgets of the future, there is a more serious side to smart home devices. They assist people in caring for older people, making it easier for families and pets to interact with and care for them. A better understanding of how houses work and being able to use them can help save energy – consume our heating costs.

Uzbekistan is implementing the Internet of Things technologies in the construction of smart cities and agriculture.

Uzbekistan, as a country that has been using the approach to the technological breakthrough of the installation since 2018, is actively using the Internet of Things technologies, in particular in the construction of Smart and Safe Cities.

Modern cities that have accumulated a lot of social, technological and environmental problems, which have become experimental sites for the coming digital era. The modernization of IT technologies with urban infrastructure and services promises not only to streamline and improve the lives of citizens, but also save money. This concept, higher speed as "Smart City", is associated with the implementation of the Internet of Things (IoT) and can be implemented depending on the degree of expression of the city and its financial capabilities.

Transportation, utilities and security are the main areas where the opportunities of wireless digital technologies are already being successfully applied. Invisible wires of wireless communication entangle the city today, connecting its inhabitants with the foreign economy of IoT devices.

Expected by 2020, the official launch of a new generation of the 5G communication standard, which provides the transfer of large amounts of data at ultra-high speeds. This, in turn, can give rise to mass speculation, both already development and completely new developments in the concept of "smart city". A few use digital and communication technologies that are used to solve all sorts of infrastructure and social problems: traffic, lighting, waste management, education, healthcare, etc.

Uzbekistan, also following global developments, has taken a course in the construction and success of Smart City projects in several cases. In 2017, the President of Uzbekistan Shavkat Mirziyoyev implemented a program of measures to implement the Safe City project for 2017-2023, covering the whole of Uzbekistan.

In accordance with the Decree of the Cabinet of Ministers of the Republic of Uzbekistan No. 48 dated January 18, 2019, the reliability of the Smart City technology compliance concept in the Republic of Uzbekistan and the plan of practical measures for its implementation for 2019-2030, which will be implemented in four cases.

The first stage (2019-2021) - determining the rationale for the smart city construction approach - includes:

- formation of a territory profile;
- the evaluation was evaluated positively;
- definition of development indicators;
- analysis of working capital and income turnover.

The second stage (2022-2024) is the development of a smart city search discovery strategy:

- involvement of the parties;
- determining the focus of activities and plans;
- risk assessment;
- formation of financial strategy;
- definition of discovery results and goals.

The third stage (2025-2027) - detailed construction design:

- budgeting;
- efficiency forecast;
- discovery of information system and capabilities.

Fourth stage (2028-2030) - application and evaluation of effectiveness:

- mixed (with all interested meetings) meeting;
- performance monitoring;
- assessment and reassessment (analysis of trends, investment parameters), provision of deployment (expansion).[7]

The technological solutions used should include general generic services, reduce the consumption of resources. At the same time, Smart City must constantly interact (exchange information) with citizens - users providing services, analyze cases of using IoT technologies, constantly improving them and introducing new intelligent solutions.

One of the main factors of living comfort in any metropolis of the world is security, which is ensured by the Internet of Things technologies. business security. Security issues are quickly resolved in "smart" places of consumption of the "Safe City" system based on digital technologies. This platform is a single system with separate management, monitoring and crisis detection. It includes tools for collecting information through video cameras and sensors, a "cloud" matrix for processing "big data" and a command post with visualization. The intelligent system uses communication between the main services, video transmission from a place in space, location of nearby patrols, flow accounting, traffic control, vehicle inspection. All data flows depending on the decision center.

One of the elements of the "Safe City" system has already been implemented in Tashkent: "smart" video surveillance cameras are operating at 120 intersections, fixing violations. Information from the cameras is transmitted to the crime monitoring center, which was launched in July 2017. This project has completely covered Tashkent and is being implemented in the regions, in particular, in Fergana and Samarkand. Further development of the software complex is carried out by the Center for Information Security and Assistance in Ensuring Public Order. The post of Deputy Minister for ICT Development, responsible for the implementation of Safe City projects, has been created. The complex is integrated with information systems of government agencies, video surveillance systems, analytics sensors, data processing centers. A unified dispatching service is being created for the Ministry of Internal Affairs, the Ministry of Emergency Situations, ambulance, fire safety, which receives calls to the number 112 and signals from SOS buttons. All incidents recorded by sensors and video cameras are reflected in the situational center, thanks to which the state of security in the capital is analyzed on an interactive map online. Also in Tashkent, an analytical video surveillance system has been introduced in public transport and parking lots with online payment and a car number recognition system are being created.

Thus, a "smart" city in Uzbekistan is a single system with a center for managing, monitoring and responding to crisis situations. The implementation of the planned measures for the development of "smart" cities in Uzbekistan will lead to an increase in the level of security of the population, a

decrease in the level of crime, an increase in the country's tourism potential, an improvement in its investment climate and the quality of services provided by the state.

In 2021, online negotiations were held between the Institute of Physics and Technology and the Institute of Materials Science of the Academy of Sciences of the Republic of Uzbekistan with representatives of DK Ecofarm Co., Ltd. (The Republic of Korea). DK Ecofarm is one of the leading companies in the implementation of the Smart Farming system in the Republic of Korea.

The purpose of the online negotiations was to establish close cooperation for the joint development and implementation of smart farming technologies in Uzbekistan using renewable energy sources, semiconductor sensors and Internet of Things technologies, as well as the joint implementation of projects related to the commercialization of these technologies.

As a result of negotiations, a memorandum of cooperation was signed between the Institute of Physics and Technology and the Institute of Materials Science of the Academy of Sciences of the Republic of Uzbekistan with DK Ecofarm Co., Ltd. (The Republic of Korea).

In accordance with the agreement, the parties will cooperate in the development of smart agriculture technologies in Uzbekistan and a number of other related areas. It should be noted that building a digital economy involves the introduction of information technologies in all sectors of the economy, including agriculture, which is one of the key industries for Uzbekistan. Therefore, the main direction of cooperation with DK Ecofarm Co., Ltd. there will be a joint development and practical application of a set of technical solutions and robotic intelligent technologies for growing agricultural products in closed systems (“Smart Greenhouses”) based on the use of the Internet of things and renewable energy sources, as well as semiconductor sensors.

The practical application of these technologies can reduce production costs in agriculture and significantly increase productivity and crop yields.

Conclusion. In conclusion, it can be noted that the Internet of Things technology will help to take the best positions in its field, establish close contact with customers and personalize offers for them, expand the sales market, quickly respond to changes in market conditions - this is what any entrepreneur wants. Moreover, IoT allows you to create a combination of intelligent devices (for example, various kinds of remote data collection tools and robots) connected by multiprotocol communication networks and human operators. The synergy of different things combined with creative possibilities can bring qualitatively new results.

According to Internet traffic statistics, the Internet of Things shows great promise in the technology sector. By 2030, the estimated number of IoT devices will increase to 125 billion. Projected global spending on IoT in 2023 will be 1.1 trillion dollars.

As a result, we are seeing the following picture: manufacturers of telecommunications equipment, telecommunications operators, and the global community are taking measures to ensure the widespread introduction of telecommunications systems according to the 5G standard from 2020. If we sum up the numerous forecasts of experts, then in 2025-2030 it is possible to expect the following picture: 80-100 billion connections to the Internet; 7-19 trillion dollars will make up the global IoT market.

REFERENCE.

1. Pankova L. N. Internet of things in the digital economy // Actual research. 2020. No. 24 (27). pp. 90-93. URL: <https://apni.ru/article/1643-internet-veshchej-v-tsifrovoj-ekonomike>.
2. https://vuzlit.ru/962519/razvitiye_interneta_veschey
3. https://ko.com.ua/internet_veshhej_v_2020_g_budet_vklyuchat_svyshe_38_mlrd_ustrojstv_111600
4. <https://everything.kz/article/36922966-zatraty-na-rynke-interneta-veshchey-prevysyat-1-trln-v-2020-godu>
5. <https://stenco-rostov.ru/to-open-a-business/problems-bezopasnosti-interneta-veshchei-i-sposoby-ih-resheniya/>
6. ITU towards "IMT for 2020 and beyond". <https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/imt-2020/Pages/default.aspx>
7. Narzullaeva D.K., Abdullaeva D.K. «Uzbekistan in the construction of smart cities» // Economic Review No. 8 2020 <https://review.uz/post/uzbekistan-v-stroitelstve-umnx-gorodov>