

APPLICATION OF MODERN TECHNOLOGIES FOR THE PURPOSES OF SUSTAINABLE DEVELOPMENT

Kamyshnikov I.N.¹,

e-mail: ivankamyshnikov@outlook.com,

¹Revealbot INC, Walnut, the USA

The article examines the relevance of the problem of using and implementing innovations to achieve sustainable development in the context of international experience. The link between digitalization and sustainable development is an important aspect of the development of the IT sector, especially in light of the development of technologies such as artificial intelligence. Two areas of application of innovative technologies are distinguished: blockchain and the use of new IT technologies in medicine. Blockchain technology is actively used in the field of environmental monitoring. An innovative project, Planetwatch, is being analyzed, the purpose of which is to improve the quality of monitoring of environmental pollution. Attention is paid to the development of Internet technologies related to digital health. Developing projects Botkin.AI – a software platform for diagnosing and assessing the risk of diseases using artificial intelligence technologies and Artiness – an innovative startup that offers augmented reality solutions used in the field of medicine are analyzed. Shift towards digital health means complementing e-health capabilities with analytic and mathematical medical data processing and smart modules that provide new quality of care, including support for medical decision-making. It is concluded that the pandemic has accelerated an important global trend – digital transformation, blockchain and artificial intelligence, which allow uniting the efforts of authorities, corporations and citizens to solve many environmental and social problems that stand in the way of sustainable development of all mankind. Today, there is a great opportunity to take advantage of the post-pandemic period to accelerate recovery, including social recovery, and increase business resilience through innovation.

Keywords: sustainable development, IT, innovation, SDGs, blockchain, artificial intelligence

ПРИМЕНЕНИЕ СОВРЕМЕННЫХ ТЕХНОЛОГИЙ ДЛЯ ДОСТИЖЕНИЯ УСТОЙЧИВОГО РАЗВИТИЯ

Камышников Иван Николаевич¹,

e-mail: ivankamyshnikov@outlook.com,

¹Revealbot INC, Уолнат, США

В статье рассматривается актуальность проблемы использования и внедрения инноваций для достижения устойчивого развития в контексте международного опыта. Связь между цифровизацией и устойчивым развитием является важным аспектом развития ИТ-сектора, особенно в свете развития таких технологий, как искусственный интеллект. Выделяют две области применения инновационных технологий: блокчейн и использование новых ИТ-технологий в медицине. Технология блокчейн активно используется в сфере экологического мониторинга. Анализируется инновационный проект Planetwatch, целью которого является повышение качества мониторинга загрязнения окружающей среды. Уделяется внимание развитию интернет-технологий, связанных с цифровым здоровьем. Проанализированы разрабатываемые проекты Botkin.AI – программная платформа для диагностики и оценки риска заболеваний с использованием технологий искусственного интеллекта и Artiness – инновационный стартап, предлагающий решения дополненной реальности, применяемые в сфере медицины. Переход к цифровому здравоохранению означает дополнение возможностей электронного здравоохранения аналитической и математической обработкой медицинских данных и интеллектуальными модулями, обеспечивающими новое качество медицинской помощи, включая поддержку принятия медицинских решений. Делается вывод, что пандемия ускорила

важный мировой тренд – цифровую трансформацию, блокчейн и искусственный интеллект, которые позволяют объединить усилия органов власти, корпораций и граждан для решения многих экологических и социальных проблем, стоящих на пути устойчивого развития всего человечества. Сегодня у нас есть прекрасная возможность воспользоваться преимуществами постпандемического периода для ускорения восстановления, в том числе социального, и повышения устойчивости бизнеса за счет инноваций.

Ключевые слова: устойчивое развитие, ИТ, инновации, ЦУР, блокчейн, искусственный интеллект

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Introduction

As long as the 9 billion people expected in 2050 and the current generations can live well within the limits of the planet, the role played by science, technology and innovation it must be more recognized and valued. Although technological changes – from the development of ICT, to nano and biotechnology no to the creation of social platforms they have connected and mobilized people around the world – have already strongly contributed to obtaining efficiency results in society in which we live, the need is now being reiterated at the international level of a renewed commitment, especially by the private sector with the support of appropriate public incentive policies, in development of technological innovations that are able to lead towards consumption and production models based on a footprint “Green” and respectful of the environment. Technologies being the answer to a vital and transversal need for every growth objective, theirs potential needs to be strengthened and steered in the right direction through the construction of a legislative and institutional system that incentives businesses to invest in new tools and infrastructures.

Sustainable development and the search for a balance between economic, social and environmental priorities

The United Nations, through target 17.7, draws attention of companies on the development of technological solutions capable of responding to sustainability needs. The commitment is in fact to “promote the development, transfer, dissemination and dissemination of environmentally friendly technologies to developing countries on favorable conditions, and also on facilitated and preferential conditions, as agreed by mutual agreement”. International organizations such as the World Business Council for Sustainable Development (WBCSD) and the UN Global Compact also encourage companies to place sustainability at the center of their creative and technological development processes so that, along innovative lines, they can develop products capable of address the environmental, social and economic issues underlying the challenges of the twenty-first century [1]. After all, those companies that have always recognized technology as a critical success factor have always survived on the market. The search for concrete solutions has focused attention on a further fundamental aspect for the success of the 2030 Agenda, even if often overlooked: the skills and competences of individual countries. Since the 1992 Earth Summit in Rio de Janeiro it has been agreed that the construction, development and renewal of local, national and international capacities would be fundamental to foster development: already chapter 37 of Agenda 21 recognized in the building the driving force that would lead countries, especially economies in transition, to identify more efficient and sustainable solutions to the obstacles that inhibited people and organizations from achieving their development goals [2; 3]. Today the issue of capacity building is once again recognized and valued as an indispensable “mean of implementation” of the 2030 Agenda, through the 17.9 target which encourages strengthening international cooperation to ensure that the skills present in the various countries are able to cope with their own needs de national and are exploited to contribute to sustainable development.

The UN SDGs adopted in 2015 until 2030 are a continuation of the UN Millennium Development Goals. Their key task is to transform the world for the prosperity of people and our entire planet, now and in the future. They are designed to unite states and society, including business, to address common global challenges facing humanity. The need to create SDGs was due to the importance of linking the economy, government, business, financial institutions, society and the environment into a single system of relationships and finding a solution to the problems facing our planet [4]. Climate change, land and water management, air pollution, access to clean

water, biodiversity conservation, poverty alleviation and others. 17 SDGs have been established, they are all a single system, exist as a single whole, where each goal depends on all the others and their influence. Achieving the SDGs by 2030 will open up new economic opportunities, create 380 million new jobs.

Sustainable development and the search for a balance between economic, social and environmental priorities is a global trend and a topic that is gaining relevance in the world, and especially in Russia and Italy. The link between digitalization and sustainable development is an important aspect of the development of the IT sector, especially in the light of the development of technologies such as artificial intelligence [5].

It is important to note that the pandemic has accelerated an important global trend – this is digital transformation. The fourth industrial revolution is happening very quickly, digital innovations, artificial intelligence, the Internet of things – all this is changing the face of industrial production. “Digital technology has been integrated into our time and has become the most visible presence in our daily lives. Nowadays, virtual reality (VR) scene technology, man-machine dialogue, artificial intelligence (AI), image and graphic processing, big data, and other technologies emerged one after another and have been applied to every aspect of our lives” [6]. However, it is very important to be aware of both the positive and negative consequences of this. A striking example is the widening of the digital divide; the world community should not allow certain regions to be left behind. In addition, there is an increasing migration of business to the digital environment, many aspects of business are happening online. At the same time, there is a downward trend in foreign direct investment. Today, there is a great opportunity to take advantage of the post-pandemic period in order to accelerate recovery, including social recovery, and increase business resilience.

We can highlight 2 main areas where modern technologies can boost the achievement of sustainable development – blockchain and medical innovations. Obviously there are plenty of spheres where modern technologies, different IT innovations may positively influence the achievement of sustainable development goals ranging from space exploration and satellites to Self-driving car.

Practical application of blockchain technology as an integral element of organizational innovation

First of all, I would like to focus the attention to the application of blockchain technologies.

At the initial stage, blockchain was considered only as a technology for creating and operating cryptocurrencies. After that, ideas and solutions began to appear, focused on the optimization of financial, corporate and government activities. So, one of the fastest growing areas of use of blockchain platforms now is decentralized financial systems that provide an alternative to classical banks due to maximum control over their finances and the absence of a trust agent pursuing their interests. Today, decentralized applications and services are used in a wide variety of areas, increasing the transparency and trust of processes relative to centralized approaches. Resolving issues of trust between several participants, immutability and availability of data – these are the tasks that blockchain is best suited for [7; 8].

Therefore, blockchain began to play a separate and special role for sustainable development projects. In terms of preserving the environment, cases are already being implemented to account for resource allocation and control supply chains. Models are beginning to be built that will stimulate people and entire states to take a more responsible approach to issues of ecology, consumption and the future of our planet. It is not enough just to ratify the Paris Agreement; it is also necessary to fulfill the obligations undertaken. How can you verify that all parties are following the agreement? In an ideal world, blockchain as the underlying infrastructure would create a trusted environment in which hiding emissions would be as problematic as possible. How far are we from this now and does blockchain help solve the challenges of humanity now?

Let's start with the simplest scenario where a distributed and trusted registry can help – environmental monitoring. For example, data on air quality in the atmosphere, temperature changes can be collected using smart sensors installed in factories, residential areas and even nature reserves. Data recording, verification and storage will take place inside the blockchain infrastructure, and the risks that real data on pollution will be manipulated are significantly reduced. And such initiatives are not just in the plans – small pilot projects have been implemented in different countries for several years. So, all of the above begins to be carried out in Europe with the support of CERN in the framework of the Planetwatch project.

Planetwatch is an innovative project, which goal is to increase the quality of monitoring of environment pollution. The project is using modern IT technologies, especially Blockchain solutions, and also tries to engage local communities thus raising public awareness about environment pollution. Citizens have the opportunity to install and operate special sensors to detect potentially harmful pollution. In doing so, the citizens can receive back the kind of rewards – tokens. Thus, the company can have the possibility to use live and updated data, however the delivery is cost effective. The project can be defined as a Smart city project, implement a circular, “green data” economy where citizens make their city smart and reap immediate benefits from their commitment.

The initial goal is to leverage air pollution and raise awareness about the potential negative cause of it.

“Outdoor sensor data are validated, analyzed and written on the Algorand blockchain. Sensor owners receive Planet token rewards, which can be redeemed for air purifiers and other useful products. Data is then shared across a range of channels, including mobile and web Apps for consumers, specialized dashboards for corporate and governmental users, as well as data feeds for online media outlets”¹.

“Our ‘Smart City as a Service’ solutions leverage a circular token-based economy where citizens make their city smart and earn rewards from their commitment. Following partnerships with local businesses and governmental entities, rewards could be redeemed against free tickets for public transport and other environmentally-friendly services. Finally, PlanetWatch will allocate a fraction of the total rewards budget to buy carbon credits from local projects, wherever applicable, further reducing the city’s carbon footprint”².

Such project may solve a number of issues, such as air pollution, community engagement and also lower the pressure to the authorities.

Moreover, such project has been implemented in Italy, in particular in Milan and Taranto. Air pollution in Milan is high, continuously exceeding the limits for health protection defined by the European Union. Key pollution drivers are road traffic, domestic heating systems and emissions from industrial plants around the city³. As for Milan, the project started on 26 October 2020 and there are 76 connection nowadays. Taranto is a notorious Italian city for air pollution, mostly due to the presence of ILVA steel plant, which accumulates 83 percent of dioxide emissions in Italy. In Taranto the project started on 21 September 2020 and up to now there are only 22 connections.

The number of blockchain application scenarios for sustainable development is increasing every year. When implemented appropriately, technology can help simplify and reduce the cost of many processes. And most importantly, it brings real results.

The technology is already being used by the world’s leading organizations, including the UN, to preserve and develop our planet. Businesses are joining communities to develop green technologies together. One such initiative, the Climate Chain Coalition, already brings together over 170 companies from around the world.

Blockchain allows to consolidate the efforts of authorities, corporations and citizens to solve a variety of environmental and social problems that stand in the way of sustainable development of all mankind. Some can offer funding, others – large-scale implementation and support at the legislative level, and still others – independent supervision and new ideas. Such a formula for cooperation, confirmed by real projects, no longer looks utopian, but promising.

In 2018, the Drone-Ecologist project was launched in Togliatti⁴. Using a specially designed water drone, Togliatti State University and Airalab Rus began measuring water pollution in the Kuibyshev reservoir, the largest reservoir in Eurasia. The blockchain presented in this project is used for the purpose of obtaining objective information on water quality for presentation to interested parties. The drone provides its services through a web application that allows the user to connect to the blockchain service on demand and receive socially significant data without distorting the information. The uniqueness of the drone, which is an autonomous compact solar-powered vessel, lies in the fact that the route of its movement can be laid according to a specific mission, when there is no need to control the device from the shore. All data is transferred to the server and

¹ White Paper PlanetWatch SAS March 2021 SIREN 880 415 724 R.C.S. Bourg-En-Bresse.

² White Paper PlanetWatch SAS March 2021 SIREN 880 415 724 R.C.S. Bourg-En-Bresse.

³ City of Milan. – URL: <https://planetwatch.io/project-milan/> (accessed: 28 May 2021). – Text: electronic.

⁴ ITMO.NEWS Environmental-Monitoring Water Drones to Be Tested on St. Petersburg Rivers (2020). – URL: https://news.itmo.ru/en/startups_and_business/innovations/news/9605/ (accessed: 01 Jun 2021). – Text: electronic.

cannot be tampered with. Measurements are made according to several particularly important parameters. The control system includes several sensors that monitor the content of oxygen and hydrogen in water, electrical conductivity and temperature. This project has already gone beyond Russia and is actively being considered by companies in South America.

One of the initiatives to maintain environmental sustainability was the idea of planting a trillion trees around the planet by 2030. According to Swiss scientists, this will remove from the atmosphere an amount of carbon dioxide comparable to what humanity will produce over the next 10 years. Such a large-scale project is going to be carried out by the efforts of the community, in which we are ready to accept everyone who is ready to contribute to solving environmental problems. This structure will be managed, coordinated and financed using the blockchain platform.

Transition from e-health to digital healthcare

The COVID-19 pandemic has become a powerful stimulus for the development of medical technology. Companies around the world are actively using modern technology to improve the efficiency of healthcare workers, improve remote patient care and develop medical devices that save lives every day.

The current trend in global health is the shift from e-health to digital health. E-health has provided electronic document flow between a patient, a doctor and a medical organization, the introduction of telemedicine technologies into the practice of providing medical care, the creation and maintenance of medical databases with information about all cases of a patient's request for medical care, including information from mobile medical devices and other information that can be collected remotely. Moving to digital health means complementing e-health capabilities with analytic and mathematical health data processing and intelligent modules, which provide a new quality of care, including support for medical decisions. Digital health is closely related to the development of Internet technologies.

Medtech, or medical technology, is the use of gadgets and services in healthcare. This includes applications, information networks, and other developments that can be used by patients and doctors. Here are some of the things that medical technology can be useful for:

- analysis of medical images (ultrasound, CT, MRI, test results);
- support for medical decision making;
- selection of individual treatment;
- remote monitoring and patient assistance;
- drug development;
- prosthetics using intelligent systems.

Deloitte predicts that spending in the global healthcare market will reach \$ 10.059 trillion by 2022⁵. A particular example of modern medical technologies is artificial intelligence, which is now being actively implemented in healthcare. According to Precedent Research, the volume of the global artificial intelligence market in healthcare reached US\$ 11.06 billion in 2021 and is expected to reach US\$ 187.95 billion by 2030, increasing by an average of 37 % during the forecast period from 2022 to 2030⁶. Figure 1 shows a diagram of the volume of artificial intelligence in the healthcare sector.

As we can observe the AI market in Health Industry will grow rapidly in next 8 years. According to PwC data Healthcare is the market with the highest potential for AI applications; VAs and conversational bots will be used more and more across all the industries also considering COVID-19 impact.

It is really important to mention that Italian and Russian markets of AI are the most promising and fast-growing in the world according to the research of PwC. Artificial intelligence is the fastest growing segment within Italian digital market and is expected to reach a total value of €0.4 Bn by 2022, registering a Cagr of 27 % between 2020 and 2022.

⁵ Deloitte website (2021). – URL: https://www.deloitte.com/global/en.html?icid=site_selector_global/ (accessed: 01 Jun 2021). – Text: electronic.

⁶ Precedence Research website. –URL: <https://www.precedenceresearch.com/artificial-intelligence-in-healthcare-market/> (accessed: 01 Jun 2022). – Text: electronic.

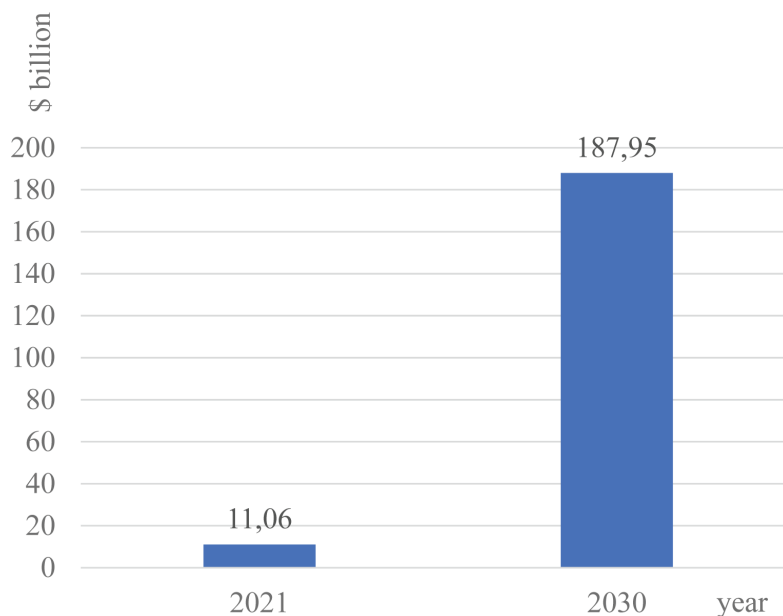


Figure 1 – Diagram of the volume of the global artificial intelligence market in the field of healthcare⁷

Another interesting example is a Russian project called “Botkin. AI”⁸.

Botkin.AI is a software platform for diagnostics and risk assessment of diseases using artificial intelligence technologies. The Intellogic project Botkin.AI is a software platform for the analysis of medical images using artificial intelligence technologies. Goal # 3: Good health and wellbeing. The platform allows radiologists and oncologists to analyze and recognize diagnostic images of CT, digital X-rays and mammography examinations. The solution is designed to reduce costs and improve diagnostic accuracy, as well as identify pathologies at an early stage. Currently implemented: – a product for the analysis of CT examinations of the chest, the main task of which is to detect malignant neoplasms in the lungs in the early stages; – a product for analyzing digital X-rays in order to find the main pathologies of a non-oncological nature (tuberculosis, pneumonia, etc.); – mammography analysis product for early detection of breast cancer.

Example of similar AI start-up we may find in Italy, the name of the project is “Artiness”⁹.

Artiness is an innovative start-up that offers solutions in the field of augmented reality applied to the medical field. We at Artiness have an ambitious vision: to revolutionize the paradigm of current technologies in the medical field through 4D holographic visualization of patient-specific anatomies. From standard clinical data, such as diagnostic images, we reproduce realistic, dynamic and accurate anatomical models with automated software.

Artiness aims to become a leading company in the supply of innovative technologies to clinical centers to improve the standards of care in surgical interventions and percutaneous treatments, with particular attention to European countries and those emerging in the areas of the Middle East for remote assistance. Now there are eight facilities, which participate in the project, five Italian and three European and the main goal for next year is to have about 20–30 public and private hospitals that use our technology.

Such startups and technologies can improve the efficiency of medical interventions and quality of medical support this contributing to the Goal number 3.

Another interesting issue I would like to raise in the context of technological and medical IT development is the inclusion of disabled people. The situation with disabled people and the percentage of them who is engaged in labor market is almost the same in Russia and Italian context.

According to the All-Russian Center for the Study of Public Opinion, less than 30 % of the 4 million able-bodied people with disabilities work in Russia. The reason is that people with disabilities often have low

⁷ Разработано автором.

⁸ Botkin AI website (2021). – URL: <https://botkin.ai/> (accessed: 01 Jun 2021). – Text: electronic.

⁹ Artiness Website (2021). – URL: <https://www.artinessreality.com/> (accessed: 04 Jun 2021). – Text: electronic.

professional qualifications and poor business communication skills. Employers' concerns about this category of job seekers are not unfounded.

To facilitate the discovery and dialogue between people with disabilities and employers, exactly one year ago, in December 2019, the Everland inclusive project, with the support of Beeline, launched an online platform for the job placement of people with different types of disabilities¹⁰.

During the year, more than 600 people from Russia and the CIS countries passed through the Everland platform. More than 200 of them have found jobs and an equal number are now training in new specialties, such as web design, content and PR, accessibility testing of websites and applications for the blind and others.

In Italian context the number of disabled people who perform any work activity is around 31 percent, so as in Russia another 69 percent of disabled population is lagged behind. It is not only create some social tension but also created a burden for the government to sustain them, the inclusion of the population with disabilities may not only make their lives more sustainable with psychological and financial point of view, but also create additional value for economy. That is why it is really important to develop and promote special platform which may help people with special need not only to find employment but also develop necessary skills. The example of Russian project may be also used in Italian reality.

Conclusion

It is important to note that the pandemic has accelerated an important global trend – this is digital transformation. The fourth industrial revolution is happening very quickly, digital innovations, artificial intelligence, the Internet of things – all this is changing the face of industrial production. However, it is very important to be aware of both the positive and negative consequences of this. A striking example is the widening of the digital divide; the world community should not allow certain regions to be left behind. In addition, there is an increasing migration of business to the digital environment, many aspects of business activities are happening online. At the same time, there is a downward trend in foreign direct investment. Today there is an excellent opportunity to take advantage of the post-pandemic period in order to accelerate recovery, including social recovery, and increase business resilience.

Despite the pandemic and the associated global losses for the economy and society, the 2030 agenda is a kind of guiding star for the world community.

References

1. *Smirnova T.S., Kamyshnikov I.N.* Problems of implementation of the Sustainable Development Goals in Russia // *Moscow Economic Journal*. – 2019. – No. 8. – P. 241–249. [In Russian]
2. *Bartolacci F., Caputo A., Soverchia M.* Sustainability and financial performance of small and medium sized enterprises // *A bibliometric and systematic literature review in Business Strategy and the Environment*. – 2020. – Vol. 29, issue 3. – P. 1297–1309. – ISSN 0964-4733.
3. *Giusepponi K.* Win-Win Situation // *Encyclopedia of Sustainable Management*. – Cham: Springer, 2022. – P. 1–3. – ISBN 978-3-030-02006-4.
4. *Smirnova T.S., Kamyshnikov I.N.* Administrative reforms in the Italian Republic 1990–2000 and their influence on the regulation of public administration // *Economics and Entrepreneurship*. – 2018. – No. 7 (96). – P. 284–288. [In Russian]
5. *Rudskaya I., Rodionov D., Kudryavtseva T., Skhvediani A.* Sustainable development and engineering economics // *Sustainable Development and Engineering Economics*. – 2021. – Vol. 1 (1). – P. 6–13. – DOI 10.48554/SDEE.2021.1.1.
6. *Wang X., Shi J., Wang Z.* Accurately Cognising the Digital Economy and Facilitating Its Healthy and Sustainable Development in China // *Sustainable Development and Engineering Economics*. – 2022. – Vol. 3. – P. 62–74. – DOI <https://doi.org/10.48554/SDEE.2022.3.4>.
7. *Avramenko A.A., Mikov V.V.* Problems of development of the smart cities // *Education and science in Russia and abroad*. – 2018. – No. 6 (41). – P. 143–145.

¹⁰ Everland website (2021). – URL: <https://evland.ru/> (accessed: 01 Jun 2021). – Text: electronic.

8. *Shamakhov V.A., Koryagin P.A., Kuntishev R.A.* Blockchain Technology as a Factor of Global Modernization of International Processes of Customs Regulation. Application of the Digital System of Distributed Registers in the Customs Union of the Eurasian Economic Union Countries // *Administrative Consulting*. – 2018. – Vol. 6. – P. 63–67. [In Russian]