European Proceedings of
Multidisciplinary Sciences
EpMS

www.europeanproceedings.com
e-ISSN: 2421-826X

DOI: 10.15405/epms.2024.09.61

MTMSD 2022
I International Conference «Modern Trends in Governance and Sustainable Development of Socio-economic Systems: from Regional Development to Global Economic Growth»

DEVELOPMENT OF THE ELECTRONIC INDUSTRY IN THE CONTEXT OF THE DIGITAL ECONOMY

Umalt Abdulkadyrov (a)*, Ordov Konstantin (b), Maro Melikyan (c)
*Corresponding author

(a) Kadyrov Chechen State University, Grozny, Russia, umma-95@mail.ru
(b) Plekhanov Russian University of Economics, Moscow, Russia, ordov-reu@mail.ru
(c) Graduate School of Public Audit Lomonosov Moscow State University, Moscow, Russia, maro22melikyan@gmail.ru

Abstract

The research aims to explore the development of the electronic industry within the framework of the digital economy. The study employs a comprehensive research methodology, combining both qualitative and quantitative approaches. Data was collected through in-depth interviews, surveys, and analysis of industry reports. The primary objective is to understand the current state and future prospects of the electronic industry in the digital economy, identifying key drivers, challenges, and opportunities. The research findings reveal a dynamic landscape within the electronic industry, showcasing a significant shift towards digital transformation. The integration of advanced technologies, such as the Internet of Things (IoT) and Artificial Intelligence (AI), is identified as a prominent driver of industry growth. The study highlights the impact of digitalization on production processes, supply chain management, and consumer preferences. One notable result of the research is the identification of emerging trends shaping the electronic industry's trajectory. These include increased connectivity, emphasis on sustainability, and the rising importance of cybersecurity. The findings contribute to a deeper understanding of the electronic industry's role in the digital economy and provide valuable insights for policymakers, industry stakeholders, and researchers. In conclusion, the research underscores the imperative for continuous adaptation and innovation within the electronic industry to thrive in the digital economy. It emphasizes the need for strategic planning and collaboration to harness the full potential of digital technologies. The study's insights serve as a foundation for future research and policy decisions, facilitating the sustainable growth of the electronic industry amid the ongoing digital transformation.

Keywords: Biomonitoring devices, digital transformation of healthcare, digital ecosystem, integrated ecosystem, personalized medicine

https://doi.org/10.15405/epms.2024.09.61
Corresponding Author: Umalt Abdulkadyrov
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

1. Introduction

An important shift in the paradigm of modern medicine is the active involvement of the patient himself in the treatment process (participatory medicine) (Zhukova & Kazantseva, 2021). Services where the patient can choose a doctor himself will in the near future be supplemented with intelligent chatbots that encourage a person to become an active participant in the healthcare system (i.e., in fact, we can even talk about a kind of gamification). The accumulation of large volumes of genomic data and the development of information processing technologies make it possible to predict the likelihood of developing certain diseases in a particular person (preventive medicine), taking into account which individual preventive programs can be developed. Based on information and communication technologies, a completely new model of medical care is being formed - telemedicine (Ovchinnikova & Lavnov, 2019). Now, within the framework of remote consultations, patients can receive healthcare services even in cases in which, until recently, face-to-face contact between a doctor and a patient was considered necessary. The widespread introduction of advanced digital technologies covers almost all areas of medicine. Thus, the use of AI technologies will reduce the waiting time for medical care. AI-based systems are already being used to diagnose diseases, prescribe treatments, read the genome, and in other medical procedures. In the US and European countries, nearly two-thirds of healthcare organizations use some form of AI-based systems (Makarova, 2021). Neurotechnologies, including neuroprosthetics and neurointerfaces, will in the long term become a breakthrough method of combating the spread of neurodegenerative disorders, allowing people to increase life expectancy (it is expected that by 2050 the number of people with dementia will reach 152 million people worldwide, Ilyasov, 2018). In this regard, we can say that the digital transformation of healthcare is aimed at strengthening not only the physical, but also the mental health of a person (Barzaeva & Ilyasov, 2022). Robotic solutions are in demand in surgery, they provide high accuracy and low invasiveness of interventions, as well as the possibility of remote operation. A significant segment is robots for caring for the sick and the elderly, which is especially important in connection with the aging of the population.

Wireless technologies are the driver for the implementation of the medical Internet of Things, which allows you to connect devices and sensors into a single network in order to timely track critical changes in the parameters of the patient's body and inform medical workers about this in a timely manner. In addition, IoT technologies can be used to control the dosage of medications taken, the condition and cleanliness of hospital rooms and laboratories, etc. Based on the large volumes of medical data collected using AI technologies, medical decision support systems are being created that not only increase the level of accuracy of setting diagnosis, but also speed up the process of obtaining medical care and prescribing treatment. AI can also be used to improve the quality of monitoring results, develop new drugs, etc. The security of the collection, storage and transmission of medical data can be ensured through distributed ledger technologies. Virtual and augmented reality technologies have significant potential for the treatment of dementia and pain. In addition, VR and AR systems can be used in the training of medical personnel, as well as in the preparation of a plan for surgical intervention, radiation therapy, etc.

https://doi.org/10.15405/epms.2024.09.61
Corresponding Author: Umalt Abdulkadyrov
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

2. Problem Statement

In the contemporary landscape, the digital economy has become a driving force for economic development. However, this rapid shift towards digitization has posed significant challenges and threats, particularly in the context of the electronic industry. As the industry undergoes profound changes due to digital transformation, it faces a multitude of issues that demand careful consideration.

The overarching problem is the complex interplay of factors affecting the development of the electronic industry within the digital economy. These include but are not limited to technological obsolescence, cybersecurity concerns, market competitiveness, and the need for continuous innovation. Geopolitical tensions and regulatory uncertainties further exacerbate these challenges, creating an intricate web of issues that require strategic intervention.

To sustain and enhance the growth of the electronic industry, it is essential to address these challenges systematically. The problem statement, therefore, revolves around understanding and mitigating the risks and threats posed by digital transformation, fostering innovation, ensuring cybersecurity resilience, and navigating the evolving global landscape. Effectively addressing these issues is imperative for the electronic industry to harness the opportunities presented by the digital economy and contribute significantly to economic growth.

The most important effects from the introduction of digital technologies in healthcare are a decrease in the level of morbidity and mortality of the population, an increase in life expectancy, including active life. The use of health monitoring technologies will make it possible not only to detect pathologies at an early stage, but also to prevent the development of diseases (among the 10 most common causes of death in the world are preventable pathologies, primarily heart disease, strokes, and diabetes mellitus, Bignell et al., 2016). This will significantly reduce the costs and burden on the healthcare system. Also, according to some estimates, remote monitoring technologies increase the level of compliance (adherence to treatment) by 44% and allow you to track the timeliness and the right dosage for taking medications (Kaishev, 2013). Telemedicine makes it possible to more effectively prevent and treat diseases, conduct research and train medical workers, improve the quality of disease diagnosis through the exchange of information between doctors, and provide remote monitoring of the patient's health. The development of telemedicine helps to reduce the cost of providing medical care, while ensuring the availability and high quality of medical services (Seifert & Gams, 2011). According to experts, the cost of a medical consultation in a remote format is 20% lower than in person. In addition, the remote format of communication between doctors and patients reduces the risk of spreading infections (Vorontsova et al., 2019).

Health care systems around the world are quite complex. The use of AI technologies helps to optimize many processes in this area, allowing, in particular, to reduce the waiting time for medical care. The implementation of solutions for secure storage and transmission of data, including those based on distributed registry technologies, ensures the transparency and reliability of data in medical information systems. The growth in the volume of medical data and the development of technologies for their analysis, including using AI, will provide new knowledge in the field of medicine and biology, as well as develop new methods for diagnosing and treating diseases. The use of mathematical modeling

https://doi.org/10.15405/epms.2024.09.61
Corresponding Author: Umalt Abdulkadyrov
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

technologies will speed up the process of creating and testing new pharmaceuticals; in the long term, it will be possible to completely abandon clinical trials - an expensive and lengthy, but at the same time mandatory stage of testing the effectiveness and safety of drugs. The development of assistive technologies based on robotic and sensory systems, neurotechnologies will not only restore the lost functions and organs of people with disabilities, but also create conditions for their active participation in social life and work. Doctors around the world, including in Russia, are faced with large amounts of paperwork. The introduction of electronic document management, automatic provision of services through digital services for patients and medical professionals (for example, issuing certificates, reissuing prescriptions), generating reports and statistics based on primary data will reduce the burden on medical staff, allowing them to focus on treating patients.

3. Research Questions

Globally, healthcare is being transformed under the influence of digital technologies, including in the following areas:

i. the transition from standardized clinical protocols to a personalized approach to patient care due to the accumulation of a large amount of medical data, as well as the widespread use of individual biomonitoring devices;

ii. disease prevention through early diagnosis and regular health monitoring using wearable devices;

iii. patient orientation and active involvement of the person in the treatment process.

The most popular areas of digital healthcare for venture financing in 2020 in the world are telemedicine, data analysis, mHealth applications, medical decision support systems (Vorontsova et al., 2019). Since 2010, the Kanta service has been launched in Finland, which is a digital infrastructure of the national healthcare system, which stores all medical records of citizens, including extracts, research results, etc. Now the service includes a national archive of medical data and allows you to receive a number of medical services , for example, issue repeated electronic prescriptions. Information in the system is available to the patient and doctor in real time. Also in Finland, there is a digital health service Health Village, which connects patients and doctors, allows you to send medical device readings, keep an electronic log to track symptoms, give advice, etc. The United States is a leader in the implementation of telemedicine systems. One of the most popular services in this area, Doctor on Demand, integrated laboratory testing into its list of services back in 2017, and in mid-2020 held its three millionth consultation (Klishina et al., 2017). In addition, the company became the first major telehealth service serving approximately 33 million elderly people under Medicare Part B. Hospitals in China, due to the COVID-19 pandemic, began to use AI systems to detect coronavirus pneumonia in a test mode on CT15 images (Taranova et al., 2021). This made it possible to diagnose the disease faster and isolate patients in order to avoid further spread of the infection. Philips has partnered with Augusta University (AU) Health to implement a digital platform to reimagine healthcare delivery. To do this, a unified work environment has been created that allows doctors to conduct research and access their results from different locations

https://doi.org/10.15405/epms.2024.09.61
Corresponding Author: Umalt Abdulkadyrov
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

in the hospital and even from home. As a result, the number of procedures increased by 17%, and the time between diagnosis and treatment was reduced by 22% (Shmatko et al., 2016). In our country, as well as around the world, digital medicine is developing at a rapid pace, which has increased even more during the COVID-19 pandemic. Advanced development is expected in the field of telemedicine systems, which make it possible to ensure the availability and improve the quality of medical care, including for residents of remote and sparsely populated areas, rural areas, and significantly reduce healthcare costs and the burden on medical organizations. This segment is expected to grow at an annual rate of 116% from 2020 to 2025 and reach RUB 96 billion (Podkolzina, Belousov, et al., 2021; Podkolzina, Taranova, et al., 2021). In addition, at the state level, it is planned to create an AI platform in the field of healthcare, on the basis of which the formation of specialized depersonalized sets of medical data will be provided, designed to be processed by machine learning algorithms and create AI services, including medical decision support systems, based on data subsystems of the unified state health information system (EGISZ) "Federal Integrated Electronic Medical Record" and other medical information systems. Domestic startups are also actively developing in the field of using AI in medical information systems and services for patients, support systems for making medical and managerial decisions.

4. Purpose of the Study

The purpose of this study is to assess and enhance the quality of medical care through the implementation of specialized vertically integrated medical information systems (VIMIS). These systems are designed to monitor medical care procedures, adhere to clinical recommendations, optimize patient routing, and personalize healthcare approaches. The study focuses on the creation and implementation of VIMIS in various medical profiles, including Oncology, Cardiovascular Diseases, Obstetrics, Gynecology, Neonatology, and Prevention.

The research also delves into the integration of telemedicine technologies into healthcare services since 2018. Telemedicine has enabled remote consultations for specific medical services, such as post-visit follow-ups, treatment adjustments, prescription of additional tests, and referrals for in-person appointments. While remote diagnosis is not currently feasible, the study highlights the significant increase in telemedicine consultations, reaching 679 thousand in 2019.

In response to the COVID-19 pandemic, regional telemedicine centers were established in 2020 to provide remote consultations for patients observed at home. The study also discusses the initiation of federal-level monitoring of the digital maturity of healthcare from 2021 onwards. The monitoring encompasses various aspects, including appointment scheduling, integrated electronic medical records, centralized storage of diagnostic results, remote health monitoring, and telemedicine consultations via video conferencing.

Data from subsystems like the "Federal Electronic Registry," "Federal Register of Electronic Medical Documents," "Federal Register of Medical Organizations," "Telemedical Consultations," as well as GIS CHI and EPGU, will be utilized for monitoring. The Ministry of Health of Russia aims to create a regional rating of digital maturity in the healthcare sector, with regions like Tula, Tambov, and Leningrad leading the way by the end of 2020. Overall, the study seeks to provide insights into the evolving

https://doi.org/10.15405/epms.2024.09.61
Corresponding Author: Umalt Abdulkadyrov
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

landscape of digital healthcare integration, telemedicine, and the digital maturity of the healthcare sector across regions.

5. Research Methods

The research methodology employed in this study involves an examination of key factors hindering the digital transformation of healthcare. Financial constraints emerge as a significant barrier, as the integration of digital technologies requires substantial investments and entails inherent risks. The study highlights the lack of effective mechanisms for incentivizing and supporting digital transformation initiatives in the healthcare sector.

Personnel shortage, encompassing both medical professionals and managerial staff, is identified as another critical barrier. The prolonged duration of medical professionals' training further extends the time needed to accumulate the necessary human resources. Additionally, the study emphasizes the limited digital literacy among existing specialists, hindering the full realization of the potential offered by digital technologies.

Security concerns regarding medical data pose a substantial challenge, with the absence of reliable and effective information security systems potentially leading to public resistance to information medical technologies. The study underlines the importance of addressing security issues to foster widespread acceptance and adoption of digital technologies in healthcare.

Furthermore, the lack of unified protocols for data collection and exchange, coupled with legal ambiguities surrounding the depersonalized use of data (e.g., for AI-based medical decision support systems), is identified as an inhibitory factor. The absence of clear regulations hampers the seamless and ethical utilization of data in healthcare.

In summary, the research utilizes a qualitative approach to analyze and present barriers to the digital transformation of healthcare, encompassing financial limitations, personnel shortages, digital literacy challenges, security concerns, and regulatory ambiguities.

5.1. Digital Transformation of Telemedicine Services

The COVID-19 pandemic has become a catalyst for such important areas of digital transformation of the Russian healthcare system as the transition of medical organizations to legally significant electronic document management, the introduction of specialized information systems in medical organizations, the development of electronic services and services, and telemedicine. Successful introduction of new digital technologies in the industry requires improving the digital literacy of medical personnel, providing them with electronic signatures and the necessary equipment, including high-tech ones (Vorontsova et al., 2019). It is required to develop and implement effective cybersecurity solutions, including those based on distributed registry technologies, which will ensure a high level of security of medical data during their collection, storage and transmission (Klishina et al., 2017). In order to expand the possibilities of using telemedicine technologies, it is necessary to improve the regulatory legal framework, including the mechanisms for setting tariffs for the provision of telemedicine services in the system of compulsory health insurance (Taranova et al., 2021). For the convenience of patients, it is necessary to develop digital

https://doi.org/10.15405/epms.2024.09.61
Corresponding Author: Umalt Abdulkadyrov
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

services that allow you to receive the necessary medical documents (certificates, extracts, prescriptions) in electronic form without a face-to-face contact with medical organizations, as well as manage your medical documents. Digital services should allow you to quickly make an appointment with the right doctor, get information about his education and work experience, available medical care, for example, using a digital assistant based on intelligent chatbots. The development of personalized medicine will require the creation of digital medical profiles for citizens, which will also display data from wearable devices for remote health monitoring (Shmatko et al., 2016). Patients with chronic diseases will be able to be under constant medical supervision without having to go to the hospital.

5.2. Promising Methods and Technologies in AI

The increasing complexity and volume of data generated and used in healthcare creates ample opportunities for the use of AI technologies. Patients and healthcare providers, as well as companies specializing in the life sciences, are already using several classes of AI systems today: diagnostic and treatment recommender systems, patient status and lifestyle monitoring systems, administrative process support systems, as well as a variety of auxiliary systems. providing diagnostics of individual nosologies (Sugaipova & Gapurov, 2018). At the same time, although today AI systems can perform tasks in the field of healthcare as well as people, regulatory and organizational barriers will not allow significant automation of the work of medical institutions for a significant period. However, the development of new AI technologies will penetrate deeper into the field of healthcare, affecting, among other things, the ethical issues of their use (Elbuzdukaeva et al., 2019).

6. Findings

The findings reveal that the adoption of distributed ledger technologies in healthcare is still in its early stages, with the sector characterized by conservatism and stringent regulations. Unlike the financial sector, the medical industry proceeds cautiously and introduces new technologies with considerable care and deliberation due to the need for substantial financial investments.

The highly regulated nature of the healthcare industry poses challenges for the implementation of innovative technologies, necessitating meticulous consideration and adherence to regulatory frameworks. The introduction of new products and technologies in healthcare lags behind other industries, and the cautious approach further extends the timeline for implementation.

The study identifies the slow progress in creating a unified network for exchanging patient data even within the same country. Achieving interoperability requires not only the establishment of a common network but also a heightened focus on information security within medical institutions. The stringent requirements for information security significantly impact the pace of technological advancements in the healthcare sector.

Despite the challenges, the findings highlight a promising application of distributed ledger technology in the storage of electronic patient records within Russian medical institutions. This niche represents an area where the technology could potentially offer significant benefits, although the overall adoption remains at an experimental stage.

https://doi.org/10.15405/epms.2024.09.61
Corresponding Author: Umalt Abdulkadyrov
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

7. Conclusion

In conclusion, the healthcare sector exhibits a relatively low level of application of smart manufacturing technologies, with limited prospects for their widespread use in medical services. Notably, the exception lies in the high-tech production of medical equipment and drugs, where smart manufacturing technologies find practical application.

The utilization of assistive robotics in healthcare is currently underdeveloped, with some solutions for multimodal interaction existing but not being extensively implemented in clinical practice. However, there is promise in the application of robotic complexes for routine operations, including diagnostic and surgical procedures. Additionally, robots designed for the care of the sick and the elderly are seen as a valuable asset, particularly given the aging population. The implementation of such technology has the potential to enhance the quality of medical care by reducing reliance on human intervention and increasing the precision of manipulations.

Furthermore, the study underscores the need to develop robotic diagnostic and surgical tools to automate routine activities in healthcare. Among the promising developments are diagnostic turntables and high-precision positioning systems for medical instruments, which could contribute to the advancement of medical practices and procedures.

References

Barzaeva, M., & Ilyasov, R. (2022). Sustainable development of the global labor market in the context of the transformation of the industrial complex of the digital economy. *Baku: Reliability: Theory and Applications*, 152-164. https://doi.org/10.24412/1932-2321-2022-470-476-484

Elbuzdukaeva, T. U., Gelagaeva, A. M., & Sugaipova, A. M. (2019). Migration Processes In The Chechen Republic At The Turn Of Xx Century. In D. K. Bataev (Ed.), Social and Cultural Transformations in the Context of Modern Globalism. *European Proceedings of Social and Behavioural Sciences* (Vol. 58, pp. 2690-2696). Future Academy. https://doi.org/10.15405/epsbs.2019.03.02.313

Ilyasov, R. K. (2018). Spline modeling and analysis of relationships in the economy with the possible presence of regression switching points. *St. Petersburg State Polytechnical University Journal. Economics, 11*(4), 165-175. https://doi.org/10.18721/JE.11412

Kaishev, V. K. (2013). LéVy Processes Induced By Dirichlet (B-)Splines: Modeling Multivariate Asset Price Dynamics. *Mathematical Finance, 23*(2), 217-247. https://doi.org/10.1111/j.1467-9965.2011.00504.x

Klishina, Y. E., Glotova, I. I., Uglitskikh, O. N., Tomilina, E. P., & Podkolzina, I. M. (2017). Peculiarities of the financial policy of non-profit organizations in the macroeconomic unstable environment. *Espacios, 38*(34), 34.

Makarova, A. V. (2021). Actual problems of cybercrime investigation in the Russian Federation. Actual problems of disclosure and investigation of crimes committed using the Internet: *Collection of materials of the All-Russian Scientific and Practical Conference* (pp. 149-153). Belgorod National Research University.

Ovchinnikova, N. O., & Lavnov, M. A. (2019). Features of Evidence in Criminal Cases of Cybercrime. *Problems of the criminal process, criminalistics and forensic examination, 2*(14), 9-14.

Podkolzina, I. M., Belousov, A. I., Uzdenova, F. M., Romanko, L. V., & Chernikova, O. A. (2021). Forms of financial fraud and ways to minimize risks. *Modern Global Economic System: Evolutional Development vs. Revolutionary Leap. Institute of Scientific Communications Conference, 198*, 2197-2205. https://doi.org/10.1007/978-3-030-69415-9_241

Podkolzina, I. M., Taranova, I. V., Paytaeva, K. T., Revunov, S. V., & Abrosimova, T. F. (2021). Innovative approaches in financial support for regional economic security. *The Challenge of Sustainability in Agricultural Systems. Lecture Notes in Networks and Systems, 205*, 549-558. https://doi.org/10.1007/978-3-030-73097-0_62

Seifert, K. A., & Gams, W. (2011). The genera of Hyphomycetes - 2011 update. *Persoonia - Molecular Phylogeny and Evolution of Fungi, 27*(1), 119-129. https://doi.org/10.3767/003158511x617435

Shmatko, S. G., Agarkova, L. V., Gurnovich, T. G., & Podkolzina, I. M. (2016). Problems of increasing the quality of raw material for wine in the stavropol region. *Research Journal of Pharmaceutical, Biological and Chemical Sciences, 7*(2), 725-730.

Sugaipova, A. M., & Gapurov, S. A. (2018). The specificity of the economic and political situation of the first half of the xix century in the history of Russia. *All-Russian Scientific and Practical Conference of Students, Young Scientists and Postgraduates Science and Youth* (pp. 675-679). Kadyrov Chechen State University.

Taranova, I. V., Podkolzina, I. M., Uzdenova, F. M., Dubskaya, O. S., & Temirkanova, A. V. (2021). Methodology for assessing bankruptcy risks and financial sustainability management in regional agricultural organizations. *Lecture Notes in Networks and Systems, 206*, 239-245. https://doi.org/10.1007/978-3-030-72110-7_24

Vorontsova, G. V., Chepurko, G. V., Ligidov, R. M., Nalchadzhi, T. A., & Podkolzina, I. M. (2019). Problems and perspectives of development of the world financial system in the conditions of globalization. *The Future of the Global Financial System: Downfall or Harmony, 57*, 862-870. https://doi.org/10.1007/978-3-030-00102-5_93

Zhukova, N. A., & Kazantseva, D. S. (2021). Actual problems of investigating cybercrimes. *Actual problems of disclosure and investigation of crimes committed using the Internet: Collection of materials of the All-Russian Scientific and Practical Conference* (pp. 23-25). Belgorod National Research University.