

A.B. Ashimova^{1*}, E.S. Sultanbayeva², Guo Steve³, A.T. Belgarayeva¹

¹Al-Farabi Kazakh National University, Kazakhstan, Almaty

²University of International Business, Kazakhstan, Almaty

³Hong Kong Baptist University, China, Hong Kong

*e-mail: aika910526@hotmail.com

SWOT ANALYSIS OF CURRENT STATE AND PROSPECTS FOR THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE IN KAZAKHSTANI MEDIA INDUSTRY

In case of Kazakhstan, there is a push for the widespread introduction of public information services and the modernization of management based on information technologies at the official state level. These services include the introduction of electronic government (egov.kz) and gradual digitalization of the public space as in the state program “Digital Kazakhstan”. The authors view the process of digitalization as a preliminary step towards introduction and implementation of various instruments based on artificial intelligence. Aim of the study is to examine the cases of application of various AI based tools in Kazakhstani media sphere. The scientific significance is due to the relevance of the topic, the interdisciplinary direction of work. Practical significance lies in the ability to use data in several scientific fields. Authors applied method of SWOT-analysis to examine the strengths, weaknesses, potential opportunities and threats of using electronic platforms based on various artificial intelligence tools in addition to the content analysis, which allows both for quantitative and qualitative sampling. It can be concluded that strengths of AI development in Kazakhstan include comparatively high level of digitization in comparison to other countries in the region. In order for Kazakhstan to use the full potential of artificial intelligence technologies and advanced analytics, it will also require a lot of joint efforts on the part of the state, private business and residents of the country. At the population level, we can talk about the formation of habits of using technology to facilitate everyday life, as well as the development of digital methods of work. This work contributes to understanding of the usage of AI based in technologies in various socio-economical spheres on Kazakhstan. The results of the study can be used in applied work on social journalism.

Keywords: artificial intelligence, SWOT-analysis, information technology, media industry, “Digital Kazakhstan”.

Ашимова А.Б.^{1*}, Сұлтанбаева Э.С.², Стив Гуо³, Белгараева А.Т.¹

¹ Әл-Фараби атындағы Қазақ ұлттық университеті, Қазақстан, Алматы қ.

² Халықаралық бизнес университеті, Қазақстан, Алматы қ.

³ Гонконг баптист университеті, Қытай, Гонконг қ.

*e-mail: aika910526@hotmail.com

Қазақстандық БАҚ саласындағы жасанды интеллект дамуының қазіргі жағдайы және болашағына SWOT – талдау

Қазақстан жағдайында ресми мемлекеттік деңгейде мемлекеттік ақпараттық қызметтерді кеңінен енгізуге және ақпараттық технологиялар негізінде басқаруды жаңғыртуға ұмтылыс бар. Бұл қызметтердің қатарына «Цифрлы Қазақстан» мемлекеттік бағдарламасындағыдай электронды үкіметті (egov.kz) енгізу және қоғамдық кеңістікті кезең-кезеңімен цифрландыру кіреді.

Авторлар цифрландыру үдерісін жасанды интеллект негізіндегі әртүрлі құралдарды енгізу және енгізу жолындағы алдын ала қадам ретінде қарастырады. Зерттеудің мақсаты – қазақстандық медиа саласында жасанды интеллект негізіндегі әртүрлі құралдарды қолдану мысалдарын зерттеу.

Зерттеудің ғылыми маңыздылығы тақырыптың өзектілігіне, жұмыстың пәнаралық бағытына байланысты. Практикалық маңыздылығы бірнеше ғылыми салаларда деректерді пайдалану мүмкіндігінде жатыр. Әртүрлі жасанды интеллект құралдарына негізделген электрондық платформаларды пайдаланудың күшті және әлсіз жақтарын, ықтимал мүмкіндіктері мен қауіптерін зерттеу үшін авторлар мазмұнды талдаудан басқа, сандық та, сапалық та іріктеуге мүмкіндік беретін SWOT-талдау әдісін пайдаланды. Қазақстандағы AI дамуының күшті жақтары аймақтағы басқа елдермен салыстырғанда цифрландырудың салыстырмалы түрде жоғары деңгейін қамтиды деп қорытынды жасауға болады. Қазақстан жасанды интеллект технологиялары мен алдыңғы қатарлы аналитиканың әлеуетін толық пайдалану үшін мемлекет, жеке бизнес және ел тұрғындарының бірлескен күш-жігерін де қажет етеді. Халық деңгейінде күнделікті өмірді жеңілдету үшін технологияны пайдалану әдеттерін қалыптастыру, сонымен қатар цифрлық жұмыс әдістерін дамыту туралы айтуға болады. Бұл жұмыс AI негізіндегі технологияларды

Қазақстанның әртүрлі әлеуметтік-экономикалық салаларында қолдануды түсінуге ықпал етеді. Зерттеу нәтижелерін әлеуметтік журналистика бойынша қолданбалы жұмыста пайдалануға болады.

Кілт сөздер: жасанды интеллект, SWOT-талдау, ақпараттық технологиялар, медиа индустрия, «Цифрлы Қазақстан».

А.Б. Ашимова^{1*}, Э.С. Султанбаева², Стив Гуо³, А.Т. Белгараева¹

¹Қазақский национальный университет им. аль-Фараби, Казахстан, г. Алматы

²Университет Международного Бизнеса, Казахстан, г. Алматы

³Гонконгский баптистский университет, Китай, г. Гонконг

*e-mail: aika910526@hotmail.com

SWOT-анализ текущего состояния и перспектив развития искусственного интеллекта в казахстанской медиаиндустрии

В Казахстане на официальном уровне отмечается импульс к продвижению государственных информационных услуг и модернизации управления на основе информационных технологий. Эти услуги включают внедрение электронного правительства (egov.kz) и постепенную цифровизацию общественного пространства, как в государственной программе «Цифровой Казахстан». Авторы рассматривают процесс цифровизации как предварительный шаг к реализации доступных и полезных инструментов на основе искусственного интеллекта. Целью исследования является изучение примеров применения различных инструментов на основе искусственного интеллекта в казахстанской медиасфере.

Научная значимость обусловлена актуальностью темы, междисциплинарным направлением работы. Практическая значимость заключается в возможности использования данных в нескольких научных областях. Для изучения сильных и слабых сторон, потенциальных возможностей и угроз использования электронных платформ на основе различных инструментов искусственного интеллекта авторы помимо контент-анализа применили метод SWOT-анализа, который позволяет проводить как количественную, так и качественную выборку.

Авторы приходят к выводу, что сильные стороны развития ИИ в Казахстане включают сравнительно высокий уровень цифровизации по сравнению с другими странами региона. Для того чтобы Казахстан смог использовать весь потенциал технологий искусственного интеллекта и передовой аналитики, потребуется также много совместных усилий со стороны государства, частного бизнеса и жителей страны. На уровне населения можно говорить о формировании привычек использования технологий для облегчения повседневной жизни, а также о развитии цифровых методов работы.

Данная работа вносит вклад в понимание использования технологий на основе ИИ в различных социально-экономических сферах на территории Казахстана. Результаты исследования могут быть использованы в прикладной работе по социальной журналистике.

Ключевые слова: искусственный интеллект, SWOT-анализ, информационные технологии, медиаиндустрия, «Цифровой Казахстан».

Introduction

Over the past decades, many states across the globe has been actively introducing the ideas of digitalization of all spheres of human society (Petrov, 2020). Today, the term digitalization is used in the rebranding of a complex set of processes and problems that were known and have long been discussed as processes and problems of computerization and informatization, the development of information and telecommunication technologies, the computer revolution, the information society, the knowledge society. Understanding the process of changing terminology in the public and academic consciousness allows us to see these changes from a new angle, and understand the emergence of

the terms “digital society” and “digital world” (Mironova, 2021).

In case of Kazakhstan, there is a push for the widespread introduction of public information services and the modernization of management based on information technologies at the official state level. These services include the introduction of electronic government (egov.kz) and gradual digitalization of the public space as in the state program “Digital Kazakhstan”. The authors view the process of digitalization as a preliminary step towards introduction and implementation of various instruments based on artificial intelligence.

On June 25, 2020, the state amended and supplemented the Law of the Republic of Kazakhstan dated November 24, 2015 “On Informatization” on

the regulation of digital technologies.¹ The amendment introduced novel concepts such as “intelligent robot”, “national artificial intelligence platform”, “operator of the national artificial intelligence platform” to the legislative body. According to the Law “On Informatization”, “intelligent robot” stands for “an automated device that performs a certain action or is inactive, taking into account the perceived and recognized external environment.” The need for the legislative amendment stems from the fact that already various government organizations and NGOs in Kazakhstan have been integrating bots into their platforms to communicate with the public.

The early roll out of AI based systems is important for both governmental and commercial organizations, since these technologies constantly learn a certain skill through progressive learning algorithms. According to the OECD website, by 2022 there are seven ongoing projects related to the sphere of AI or digitalization. Among others these programs include “Digital Kazakhstan”, “Artificial Intelligence Research and Development Support Fund”, Project on Fostering Productive Innovation”, “Pilot Project on AI for Cancer Research”, and “Smart Data Ukimet”.² The projects are aimed at attracting the worlds’ leading manufacturers of artificial intelligence solutions to the country; using of artificial intelligence in health care; and elevating the living standards of each resident in the country using digital techniques; set of tools to monitor economic growth and implementation of government programs. The strengthening of digitalization continues with the help of the “Digital Kazakhstan” program for 2018-2022, the purpose of which is to accelerate the pace of economic development and improve population’s quality of life, as well as the transformation of public administration in the future.

Aim of the study. In these article authors will attempt to examine the cases of application of various AI based tools in Kazakhstani media sphere.

Methods and materials

The main method used in this study is content analysis, which allows both for quantitative and qualitative sampling. In addition, in the course of the study, a comparative analysis was applied when comparing positive and negative assessments of the work of artificial intelligence in the media industry.

The SWOT analysis in this article examines the strengths, weaknesses, potential opportunities and threats of using electronic platforms based on various artificial intelligence tools. SWOT analysis is a method of strategic planning, which consists in identifying the factors of the internal and external environment of the organization, which is currently widely used for analysis in all areas.

Literature review

With the advent of various technology based on AI systems, the topic of regulation of such systems is concerning academic researchers. A growing number of commentators, scientists, and entrepreneurs has expressed alarm regarding the increasing role that autonomous machines are playing in society, with some suggesting that government regulation may be necessary to reduce the public risks that AI will pose (Scherer, 2016). Other researchers turned their attention to the impacts of automation and other AI technologies on labor markets. The common is that artificial intelligence can substitute capital for labor in the case of prediction tasks and may indirectly effect decision tasks by increasing or decreasing the relative returns to labor versus capital for decision tasks (Agrawal, et.al., 2019).

There are several studies conducted recently on the topics related to artificial intelligence in Kazakhstan. For instance, Ayapova and Skripnikova attempted to determine whether audience would be able to distinguish texts written by automated systems from human written ones (Ayapova, Skripnikova, 2022). The results showed that majority of readers were able to differentiate machine written texts, however, they were not ready for such content to appear in the Kazakhstani media. Study participants considered them to be of poor quality, incomprehensible, logically unrelated and, in principle, respondents preferred text written by skilled journalists. Prior to that Ayapova described the features of artificial intelligence application in journalism and concluded that the use of AI in creative content today is possible only in those news articles

¹ Закон Республики Казахстан от 25 июня 2020 года No 347-VI ЗРК «О внесении изменений и дополнений в некоторые законодательные акты Республики Казахстан по вопросам регулирования цифровых технологий» // Информационно-правовая система нормативных правовых актов Республики Казахстан. – <http://adilet.zan.kz/rus/docs/Z2000000347>

² OECD. Policy initiatives for Kazakhstan. <https://oecd.ai/en/dashboards/policy-initiatives?conceptUris=http:%2F%2Fkim.oecd.org%2FTaxonomy%2FGeographicalAreas%23Kazakhstan>

that do not demand a semantic load and an objective assessment of the material (Ayapova, 2021).

Media is not the only field where Kazakhstani researchers explored possibilities of AI usage in the country. For instance, Tlembayeva analyzed international legal acts and studied the activities of international organizations to conceptualize an international legal framework on issues related to the regulation of artificial intelligence. She compared national strategies and legislation in the AI field of such countries as Korea, the USA, Japan, China, Russia, Kazakhstan, and members of the European Union (Tlembayeva, 2021).

Article also relies on the insight from the study conducted by Karmys and Bastaubaeva, who analyzed the process of personnel management in public administration in Kazakhstan in the context of digitalization (2018). The authors have analyzed main political programs for the implementation of digitalization, as well as the main aspects to improve the efficiency of HR using latest digital technology. One of the conclusions in the articles states that different approaches of state bodies in naming common contests and outdated ways of posting information on Internet resources contribute to complicating the search and selection of data of interest. Authors believe that the development of a unified information standard for the posting of vacancies will properly implement the policy of digitalization policy of the electronic government and will provide an opportunity to easily find the necessary information.

Results and discussion

The global media attention in the topics of cybernetics and artificial intelligence did not go unnoticed by the Kazakhstani media outlets. A number of local television channels broadcast stand-alone programs that covered news in the field of technological advancement. A noticeable examples are various IT news programs such as “Atameken Business” and “24-hour Hi-Tech” on the channel Khabar 24. The content offered by the two programs is similar; they cover industry news and analyze the latest technological solutions in various fields both local and global. In addition to IT industry news, Khabar 24 broadcasts the “Digital Kazakhstan” and “Gylym” programs in two languages, Kazakh and Russian. The Gylym program analyzes and explores innovation in the areas of science and technology. Each issue of the program is devoted to a sepa-

rate topic such as “Face ID. The system of facial recognition”³, “Intelligent transportation system”⁴, “3D printer technology”⁵, “Electric cars”⁶. The main feature of the program is its aim to get the audience acquainted with the level of scientific development in the country, and to present the recent discoveries made in Kazakhstan.

Another program on the channel, “Digital Kazakhstan” is devoted to increase the level of digital literacy among its average viewers. In addition to presenting and explaining digital programs introduced by the state, it contains instructions and explanations on how to get certain services on governmental digital platforms. For example, the episode dedicated to the electronic IDs details how one can use it in case someone does not have the physical one in the local airports on his person, where such service is available. The episode “Relevance of Modern Technologies” focuses on new digital technologies developed by Kazakh scientists in the fight against the global pandemic a various equipment for viral diagnostics.⁷ This device, developed by Kazakhstani researchers, utilizes special sensors that, when a person takes an air sample, the data in the air is transmitted to the server powered by artificial intelligence, and the processed data detects the presence of the virus in just 2 minutes.

In addition to the fact that the topic of artificial intelligence is being actively covered in the Kazakhstani media, it also entered to the inner working of the media outlets. One notable example, is the presence of the virtual anchor on the Atameken Business TV channel. In the history of Kazakh television, this is the first occurrence of using artificial intelligence models in the television production. Since 2020, ‘i-Sanj’ hologram modeled after actor Sanjar Madi hosts daily economic news block on the channel.⁸ It can read news in a synthesized voice, designed to sound like a professional human presenter. In gener-

³ ҒЫЛЫМ I Face ID. Адамның бет-әлпетін тану жүйесі. <https://24.kz/kz/teleproject/gylym/item/457224-ylym-i-face-id-adamny-bet-lpetin-tanu-zh-jesi>

⁴ Ақылды қала. «Интеллектуалды көлік жүйесі» жобасы. <https://24.kz/kz/archive/teleproject/item/81300-intellektualdy-k-lik-zh-jesi-zhobasy>

⁵ ҒЫЛЫМ I 3D принтер технологиясы <https://24.kz/kz/teleproject/gylym/item/451327-ylym-i-3d-printer-tekhnologiyasy>

⁶ ҒЫЛЫМ I Электромобильдер. <https://www.youtube.com/watch?v=Ej-X2s7rCAQ>

⁷ Заманауи технологияның өзектілігі I Цифрлы Қазақстан. <https://24.kz/kz/teleproject/tsifrlyk-kazakhstan/item/461778-zamanaui-tekhnologiyany-zektiligi-i-tsifrly-aza-stan>

⁸ Виртуальный ведущий i-Sanj на "Atameken Business". https://inbusiness.kz/ru/tv_programs/spetsialnyy-reportazh/virtualnyj-vedushij-i-sanj-na-atameken-business?page=13

al, the Atameken Business TV channel stands out by constantly following latest trends, and the addition of virtual way of news presenting is on brand with its strategy. The goal behind the virtual presenter is to create a digital anchor that will remain poised during a live broadcast at all and increase overall efficiency as a result. Since VR anchor is essentially just a computer program, it can be easily copied and used for other broadcasting purposes, and even be in multiple locations at the same time, providing news updates on several stories. The first virtual television presenter appeared two years prior to that on the Xi-nHua TV channel in China (Gelgel, 2020). Two AI news anchors able to read news in English as well as in Chinese (Mandarin dialect) were revealed at the fifth World Internet Conference in China's Zhejiang province. In addition to the virtual presenters, channel Khabar 24 is fully automated and equipped with a robotic studio.⁹

As for the Kazakhstani periodical media, influential publications and well-known experts also express their opinion on the use of AI in modern journalism. According to a prominent journalist and media expert Adil Dzhililov: "We underestimate some global trends, such as the development of neural networks and artificial intelligence, which can greatly affect the information sphere. I think that in many ways the agenda in the information environment and in journalism will be shaped by artificial intelligence, which can process large amounts of data, technologies will appear that are simply unthinkable now" (Dzhililov, 2020). In 2018, in Almaty, attendees of educational MediaHub announced that the profession of journalism is on the line for "a quick death" and AI will completely change the field in the next couple of years. In his other interview he declared: "Journalism in the form it is now, unfortunately, will not remain in the next 10 years. Many good people who have dedicated themselves to journalism may not find a place in this brave new world"¹⁰.

Kazakhstan is a typical example of a region where traditional industries predominate in the structure of the economy (Kursiv Media, 2019). Authors believe that an increase in the value added of manufactured products could be sought in the pos-

sibilities of localizing production in the country. In such cases advancing IT industry can create a "window of opportunity" to overcome the technological backlog of the economy. In 2020, the Kazakh Ministry of Digital Development, Innovations, and Aerospace Industry, with the support of the World Bank, initiated the Smart Cities and Artificial Intelligence (SCAI) program. The objective would be to improve the quality and accessibility of private and public services based on the collection of local data, targeting certain cities in the country.¹¹ Achieving this goal depends on digital skills, private investment, and the creation of an enabling environment for AI development and qualitative data analysis. If successful, the project will enable innovative and inclusive growth, improved quality, greater transparency of public services, and increased private sector investment by exploiting artificial intelligence and data.

According to McKinsey & Company by 2030, AI and big data technology could become one of the main factors that could help Kazakhstan achieve annual GDP growth of 5-6% (Kursiv Media, 2019). AI and big data could indeed contribute to increasing labor productivity and become critical factors in economic growth. Adopting these new technologies in the extractive and manufacturing sectors could generate an estimated profit of \$5-7 billion per year. This benefit could be between \$9 and \$13 billion per year in the services sector in Kazakhstan. The effect is minor in the education, health, administration, and defense sectors. AI would nevertheless allow a very significant improvement in the population's standard of living. On an international scale, another 2018 study by McKinsey predicted that artificial intelligence could boost global GDP growth by 1.2% per year until 2030 (Bughin, et.al. 2018).

When talking about traditional industries, the oil and gas is a key sector in Kazakh national economy (Bughin, et.al. 2018). So there are a lot of hope that increasing the productivity of oil and gas fields through the use of digital technology will improve the overall competitiveness of the country in global markets. For instance, the state launched an information system for accounting for oil and gas condensate at the fields. The system automates the collection of data from metering devices at the stages of preparation, processing and transportation of oil. In the near future, there will be oil and gas deposits

⁹ MATRIX ENGINEERING ПРИСТУПИЛА К РЕАЛИЗАЦИИ ПРОЕКТА ПО РОБОТИЗАЦИИ ТЕЛЕВИЗИОННОЙ СТУДИИ КАЗАХСТАНА «ХАБАР 24» https://matrix-eng.ru/news/matrix_engineering_pristupila_k_realizatsii_proekta_po_robotizatsii_televizionnoy_studii_kazakhstan/

¹⁰ Крым и права человека: Казахстан «против» <https://exclusive.kz/expertiza/smart/115250/>

¹¹ Kazakhstan Smart Cities and Artificial Intelligence (SCAI) Program. <https://projects.vsemirnyjbank.org/ru/projects-operations/project-detail/P170270>

that control themselves and are managed by virtual teams of experts located in different countries of the world (Vorobyov, Tchero, 2018). This is precisely what the concept of digitalization and the development of AI in this area aims at. Analysts at Gartner ranked AI as the top ten strategic technology in 2017. According to their definition, artificial intelligence methods are designed for creating technologies that are able to learn, predict, adapt and take certain actions with minimal human involvement (Eremin, 2017). There are cases where AI technologies find application in digital wells and fields, underwater and aerial drones, underwater plants and production complexes, and unmanned and deserted gas production technologies in the Arctic latitudes. Working with artificial intelligence systems in gas fields will require new knowledge and skills and will stimulate the emergence of new working specialties. Oil and

gas companies that have timely developed their own industrial Internet oil and gas platforms will be in a better position due to low unit costs for oil and gas production, predictive analytics and integration of the entire production chain at a new instrumental and information and communication level (Eremin, 2017).

In this part of the study, authors made an assessment of the current state of digitalization and the development of artificial intelligence in Kazakhstan to determine the level of its development and role in solving versatile issues. The analysis of these factors are presented in the form of SWOT analysis below (Figure 1). SWOT analysis is a tool for identification of strengths (S), weaknesses (W), potential opportunities (O), and potential threats (T). The present analysis comprehensively covers the competitive position of AI technologies in various economic and social spheres in Kazakhstan.

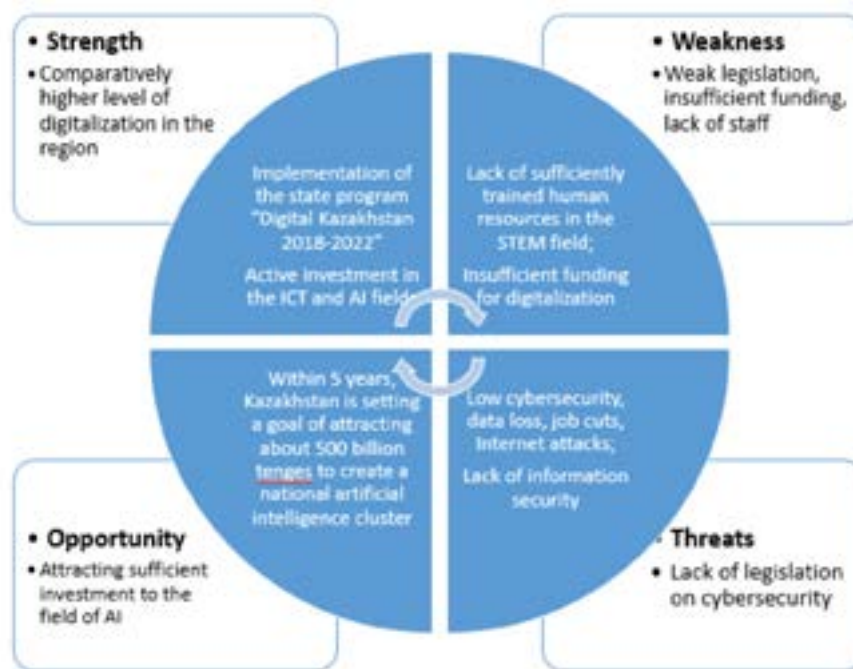


Figure 1 – SWOT analysis of the state of artificial intelligence in Kazakhstan (compiled by the authors)

Strengths of AI development in Kazakhstan include comparatively high level of digitization in comparison to other countries in the region. State program "Digital Kazakhstan" aims to not only push the process of digitalization in the country forward, but also obtain investment for these purposes. Approximately 441 million USD will be allocated for these purposes, and it is also expect-

ed to attract 528 million USD from the funds of the quasi-public sector entities (to date there are overall 6400 companies operating in this sector). In addition, the program covers not only digitization, but also the allocation of educational grants in the field of information technology, training and retraining of civil servants (Karmys, Bastaubayeva, 2018).

Weak aspects that prevent fast implementation of various state programs is lack of STEM personnel shortage. According to committee on statistics, Kazakhstan needed more than 6,000 specialists in IT technology before Covid-19 pandemic.¹² The situation is becoming only direr as the country is recovering from economic slowdown. In order to combat the shortage of specialist Ministry of Education has been providing extra funds to train more students in the needed programs. For undergraduate enrollment in the 2022-2023 academic year, the ministry has allocated about 73,000 grants overall, and more 9000 grants were allocated to “Information and communication technologies” programs.¹³ However, it will take considerable time before new university entrants will be able to join work force.

According to preliminary calculations, the direct effect of digitalization of the economy by 2025 will create an added value of 1.7-2.2 trillion tenge, thereby providing a return on investment of 4.8-6.4 times by 2025 to the total volume of investment, taking into account private investment (Decree of the Government of the Republic of Kazakhstan, 2017). However, while funding usually plays crucial role in developing technological industry, there are other opportunities available for further progress. Thus, in 2021, the level of digital literacy among population aged 6-74 years reached 87.3%, one of the highest in the region¹⁴. It is a very important milestone since digital literacy serves as a catalyst for development because it promotes self-education and the acquisition of other important life skills of an information society citizen, a consumer of electronic services.

In recent years there has been a sharp increase in threats to information security in the banking and industrial sectors and in government information systems. And even though in a ranking of 194 countries on the level of cybersecurity of the Global Cybersecurity Index, Kazakhstan ranked 31 out of 182 places¹⁵, the threat of cyber breaches looms high in the sector. Kazakhstan does not develop its own information systems, borrowing digital technolo-

gies and cybersecurity systems developed in other countries (Karmys, Bastaubayeva, 2018). In such a situation, critical state information and communication infrastructure under high risks of attack. This combined with relatively lax law regarding cyber-crime in the country are the main potential threats in implementation of future AI programs.

Obviously, to ensure the maximum effect from the introduction of new technologies, Kazakhstan will need specialists with the appropriate skills. According to the experts, by 2030, the country should have 5-10 thousand data analysts, 20-25 thousand data system developers, and 2-5 thousand data scientists. This is a major economic niche that job seekers should take a closer look at now. However, to achieve these national ambitions, the government will first have to stop the phenomenon “brain drain” that has accelerated in recent years. If 34 percent of qualified personnel left the country in 2015, 88 percent of this same labor category would have gone by 2019. The exodus of technicians, economists, and teachers is creating a shortage that could thwart the authorities’ plans.¹⁶

Conclusions

In order for Kazakhstan to use the full potential of artificial intelligence technologies and advanced analytics, it will also require a lot of joint efforts on the part of the state, private business and residents of the country. The state is responsible for creating the necessary infrastructure and environment to promote technological innovation. The role of the state in promoting the development of new AI technologies and in-depth analytics as a major customer of such technologies in the private sector is also essential. On the other hand, private businesses can make a significant difference by structuring and labeling available data for use in the implementation of AI and advanced analytics technologies. At the population level, we can talk about the formation of habits of using technology to facilitate everyday life, as well as the development of digital methods of work.

¹² https://online.zakon.kz/Document/?doc_id=38755931&pos=4;-116#pos=4;-116

¹³ http://testcenter.kz/ru/press-tsentr/novosti/?ELEMENT_ID=5115

¹⁴ <https://24.kz/ru/news/social/item/548763-uroven-tsifrovoy-gramotnosti-naseleniya-povysilsya-v-kazakhstane>

¹⁵ <https://ncsi.ega.ee/country/kz/>

¹⁶ The "brain drain" is increasing – technicians, economists, and teachers are actively leaving Kazakhstan. <http://finprom.kz/ru/article/utechka-mozgov-narastaet-kazahstan-aktivno-pokidayut-tehnari-ekonomisty-pedagogi-ottok-kvalificirovannyh-kadrov-za-poslednie-4-goda-uskorilsya-na-34-88>

References

- Agrawal, A., Gans, J. S., & Goldfarb, A. (2019). Artificial Intelligence: The Ambiguous Labor Market Impact of Automating Prediction. *The Journal of Economic Perspectives*, 33(2), 31–50.
- Ayapova, S. (2021). “Zarubezhnyye i kazakhstanskiye media ob ispol’zovanii iskusstvennogo intellekta v zhurnalistike [Foreign and Kazakh media on the use of artificial intelligence in journalism].” *Al-Farabi kazakh national university. Herald of journalism*, 60(2), 95-104. doi:10.26577/HJ.2021.v60.i2.10 – (In Russian)
- Ayapova, S., & Skripnikova, A. (2022). Ai and human created media texts: experiment results. *Al-Farabi kazakh national university. Herald of journalism*, 64(2), 78-84. doi:10.26577/HJ.2022.v64.i2.08
- Decree of the Government of the Republic of Kazakhstan dated December 12, 2017 N 827 “On Approval of the State Program “Digital Kazakhstan”.
- Eremin N.A. (2017) Digital modernization of the gas complex / N.A. Eremin, L.A. Abukova, A.N. Dmitrievsky // Actual issues of development and implementation of low-manned (remote) technologies for gas production and treatment at the fields of PJSC Gazprom: Reports of the meeting of the section “Production of gas and gas condensate” of the Scientific and Technical Council of PJSC Gazprom, Svetlogorsk, May 22–26 2017 /PJSC Gazprom. pp. 9-20.
- Gelgel, Ni. (2020). Will technology take over journalism?. *Informasi*. 50. v-x. 10.21831/informasi.v50i2.36379.
- Jacques Bughin, Jeongmin Seong, James Manyika, Michael Chui, Raoul Joshi. (2018). Notes from the AI frontier: Modeling the impact of AI on the world economy. *Discussion Paper*. McKinsey Global Institute.
- Jalilov, A. (2020). “Gosinformzakaz «pudrit lyudyam mozgi» i «demotiviruyet SMI» [Gosinformzakaz “powders people’s brains” and “demotivates the media”]. <https://rus.azattyq.org/A/Kazakhstan-Dialogi-Adil-Dzhalilov-Interview-Journalism/30763292.html>. – (In Russian)
- Karmys, G. S., Bastaubayeva, A. Z. (2018). “Swot and pest analysis of digitalization of HR processes in the civil service of Kazakhstan” *Issues of State and Municipal Administration*, no. 1, pp. 140-163.
- Mironowa D.W. “Ot kartin mira k tsifrovomu miru? [From World-Pictures to the Digital World?]” *Russian Journal of Philosophical Sciences*. 2021;64(4):110-121. – (In Russian)
- Petrov, D.S. (2020). “Stadii tsifrovoy transformatsii predpriyatiya [Stages of digital transformation of an enterprise]”. *International scientific review*, (LXVI), 39-40. – (In Russian)
- Scherer, Matthew U. (2015). *Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies*. Harvard Journal of Law & Technology, Vol. 29, No. 2, Spring 2016, Available at SSRN: <https://ssrn.com/abstract=2609777> or <http://dx.doi.org/10.2139/ssrn.2609777>
- Tlembaeva Zh. Y. (2021). “O nekotorykh voprosakh pravovogo regulirovaniya ispol’zovaniya tekhnologii iskusstvennogo intellekta v usloviyakh tsifrovoy transformatsii [On some issues of legal regulation of the use of artificial intelligence technology in the digital transformation]”. *Vestnik Voronezh State University. Series: Law*, (4 (47)), 331-349. – (In Russian)
- Vorobyov, A. E., Tcharo, H. (2018). Digitalization of the oil industry in Kazakhstan. *Problems of subsoil use*, (1 (16)), pp. 66-75.