IRSTI 06.71.07 https://doi.org/10.26577/be.2021.v135.i1.010

**A.M. Balkibayeva[1], Zh.K. Yerzhanova[2], A.G. Zhumagazieva[3]*, Song Soo Lim[4]**

[1]S. Seifullin Kazakh AgroTechnical University, Kazakhstan, Nur-Sultan
[2]Zhangir khan West Kazakhstan Agrarian Technical University, Kazakhstan, Uralsk
[3]Al-Farabi Kazakh National University, Kazakhstan, Almaty
[4]Korea University, Korea, Seoul
*e-mail: almira.adia@mail.ru

# DEVELOPMENT OF DIGITAL TECHNOLOGIES FOR AGRIBUSINESS

The contribution of small and medium-sized businesses to the Kazakhstan's GDP is just over 27%, and the share of innovative enterprises in this sector of the economy is just over 0.98%. Currently the share of SMEs in Japan's GDP is 95 percent, the United States – 80%, Western Europe – 60%. In order to be more economically stronger and independent of oil bondage for national economy is advised to increase SMEs proportion.

The primer goal of this publication to raise concerns and recommendations on boosting digital literacy within SMEs owners, particularly in agribusiness and government structures. It is undeniable that without interconnection or as they say government-private partnership such capital needed processes like digitalization of business processes for both public and private success would not be seen.

The further development of digitalization in agriculture is hindered not by the availability or weak development of Internet connections, as well as the lack of local systems for spreading knowledge and training specialists in the use of digital tools.

For various solutions in the process of the study appropriate qualitative research methods have been used: monographic, analysis and synthesis, logical and abstractive constructional, etc.

In this paper ongoing digitalization processes from government of Kazakhstan in general was presented, application of this process to one of the most important industry (agriculture) is shown, problems for further advancement of digitalization of economy is pointed and some developments were made.

The object of research is the processes and tools of digitalization of decision-making used by small and medium-sized agribusiness in Kazakhstan.

The findings of this study contribute to preparation and advancing of conceptual development of digitalization for business-government relationships, therefore increasing competitiveness of industry and economy intact.

**Key words:** digitalization, new technologies, digital solutions, small and medium business, IT solutions, IT platforms.

А.М. Балкибаева[1], Ж.К. Ержанова[2], А.Г. Жумагазиева[3]*, Сон Су Лим[4]

[1]С. Сейфуллин атындағы Қазақ агротехникалық университеті, Қазақстан, Нұр-Сұлтан қ.
[2]Жәңгір хан атындағы Батыс Қазақстан аграрлық-техникалық университеті, Қазақстан, Орал қ.
[3]Әл-Фараби атындағы Қазақ ұлттық университеті, Қазақстан, Алматы қ.,
[4]Корея университеті, Корея, Сеул қ.
*e-mail: almira.adia@mail.ru

**Агробизнестегі сандық технологиялардың дамуы**

Шағын және орта бизнестің Қазақстанның ЖІӨ-де үлесі 27% ғана асады, ал экономиканың осы секторындағы инновациялық кәсіпорындардың үлесі 0,98%-дан аспайды. Қазіргі уақытта Жапонияның ЖІӨ-дегі ШОБ үлесі 95%, АҚШ – 80%, Батыс Еуропа – 60%. Экономика жағынан мықты ұлттық экономика үшін мұнай долларынан тәуелсіз болу үшін ШОБ үлесін арттыру қажет.

Бұл жарияланымның негізгі мақсаты – шағын және орта бизнес субъектілері, әсіресе агробизнестегі және мемлекеттік органдар арасында цифрлық сауаттылықты жоғарылату бойынша ұсынымдар беру. Өзара әрекеттесусіз немесе дәлірек айтқанда, мемлекеттік-жеке меншік әріптестік, капиталды қажет ететін және технологиялық тұрғыдан көп инвестицияларсыз, мысалы, мемлекеттік және жеке табысқа бизнес-процестерді цифрландыру сияқты процестер жүзеге асырылмайтындығы даусыз.

Ауыл шаруашылығында цифрландыруды одан әрі дамытуға интернет қосылыстың қол жетімділігі не әлсіз дамуы, сондай-ақ жергілікті жерлерде сандық құралдарды меңгеруді оқыту бойынша білім мен мамандардың тарату жүйелерінің болмауы кедергі келтіреді.

 

Мақаланы дайындау барысында зерттеудің сапалы әдістері қолданылды – монографиялық, талдау және синтез, логикалық және дерексіз конструктивизм.

Бұл мақала тұтастай алғанда Қазақстан үкіметінің цифрландырудың қазіргі процестері туралы, бұл процестің маңызды салалардың біріне (ауылшаруашылығына) қолданылуын көрсетеді, экономиканы цифрландыруды одан әрі дамыту проблемаларын анықтайды және бірқатар ұсыныстар жасайды.

Зерттеу объектісі Қазақстанның және Кореяның шағын және орта агробизнесі пайдаланатын шешім қабылдауды цифрландыру процестері мен құралдары болып табылады.

Осы зерттеудің нәтижелері өнеркәсіп пен тұтастай экономиканың бәсекеге қабілеттілігін арттыратын бизнес пен мемлекет арасындағы қатынастарды цифрландырудың тұжырымдамалық дамуын дайындауға және ілгерілетуге ықпал етеді.

**Түйін сөздер:** цифрландыру, жаңа технологиялар, сандық шешімдер, шағын және орта бизнес, IT шешімдер, IT платформалар.

А.М. Балкибаева[1], Ж.К. Ержанова[2], А.Г. Жумагазиева[3]*, Сон Су Лим[4]

[1]Казахский агротехнический университет имени С. Сейфуллина, Казахстан, г. Нур-Султан
[2]Западно-Казахстанский аграрно-технический университет имени Жангир-хана, Казахстан, г. Уральск
[3]Казахский национальный университет имени аль-Фараби, Казахстан, г. Алматы
[4]Университета Кореи, Корея, г. Сеул
*e-mail: almira.adia@mail.ru

**Развитие цифровых технологий в агробизнесе**

Доля малого и среднего бизнеса в ВВП Казахстана составляет чуть более 27%, а доля инновационных предприятий в этом секторе экономики составляет чуть более 0,98%. В настоящее время доля МСП в ВВП Японии составляет 95 %, США – 80%, Западной Европы – 60%. Чтобы быть более экономически сильным и независимым от нефтяных долларов для национальной экономики, необходимо увеличить долю МСБ.

Основная цель этой публикации – осветить состояние и проблемы и дать рекомендации по повышению цифровой грамотности среди владельцев МСБ в целом и, в частности, в агробизнесе и государственных структур. Неоспорим тот факт, что без взаимодействия или, точнее, государственно-частного партнерства, капиталоемкие и технологически емкие инвестиции, для таких процессов, как оцифровка бизнес-процессов как для государственного, так и частного успеха, не был бы реализован.

Дальнейшему развитию цифровизации в сельском хозяйстве препятствуют недоступность либо слабое развитие интернет-соединения, а также отсутствие на местах систем распространения знаний и специалистов по обучению владением цифровыми инструментами.

При подготовке статьи были использованы качественные методы исследований – монографический, анализ и синтез, логический и абстрактный конструктивизм.

В данной статье были представлены текущие процессы цифровизации Казахстана и Кореи, показано применение этого процесса к одной из наиболее важных отраслей (сельское хозяйство), указаны проблемы для дальнейшего продвижения цифровизации экономики и сделаны некоторые предложения.

Объектом исследования являются процессы и инструменты цифровизации для принятия решений, используемые малым и средним агробизнесом Казахстана и Кореи.

Результаты этого исследования способствуют подготовке и продвижению концептуальной разработки цифровизации взаимоотношений бизнеса и государства, что повышает конкурентоспособность промышленности и экономики в целом.

**Ключевые слова:** цифровизация, новые технологии, цифровые решения, малый и средний бизнес, ИТ-решения, ИТ-платформы.

## Introduction

The primer goal of this publication to raise concerns and recommendations on boosting digital literacy within SMEs owners and government structures.

The Ministry of digital development, innovations and aerospace industry of Kazakhstan was created to engage in the formation and implementation of the state policy in the field of digital development of the country, in the fields of innovation, communications, public services, electronic industry, as well as engaged in the development of e-government, coordination of the activities of the State Corporation "Government for Citizens", information security, aerospace industry, geodesy and cartography.

There is a paramount need to create favorable conditions for the broad development of digital

solutions in the sector of small and medium-sized businesses due to uncontrollable outbreaks such as COVID-19.

It is undeniable that without interconnection or as they say government-private partnership such capital needed processes like digitalization of business processes for both public and private success would not be seen.

The contribution of small and medium-sized businesses to the Kazakhstan's GDP is just over 27%, and the share of innovative enterprises in this sector of the economy is just over 0.98%. Currently the share of SMEs in Japan's GDP is 95 percent, the United States – 80%, Western Europe – 60%. In order to be more economically stronger and independent of oil bondage for national economy is advised to increase SMEs proportion.

Former publication on digitalization of public services did not consider broad overview on progress of this process, particularly in agriculture. To connect public and business experience in building digital eco infrastructure in Kazakhstan this paper was designed.

Precision agriculture also has serious challenges that need to be addressed as soon as possible. Implementation of digit requires accelerated solutions to the issues of integration of new systems with existing business processes, their automation and transparency, and qualified personnel of the new generation. A very important aspect is the coverage of farmland areas with a stable mobile connection no lower than 3G. This task, which is extremely costly for Telecom operators, should be solved, most likely, in the format of public-private partnership (profit.kz, 2020)

**Literature review**

E-governance is more than just a government website on the Internet. The strategic objective of e-governance is to support and simplify governance for all parties; government, citizens and businesses. It is not difficult for people in developed countries to imagine a situation in which all interaction with government can be done through one counter 24 hours a day, 7 days a week, without waiting in lines. However, to achieve this same level of efficiency and flexibility for developing countries is going to be difficult. The experience in developed countries shows that this is possible if governments are willing to decentralize responsibilities and processes, and if they start to use electronic means (Basu, 2004).

One of the first research contributions to analyze the impact of digitalization, specifically the impact of social media and big data on a large number of European SMEs. It was found that BMI (business model innovations) and strategy implementation practices in business models led to more innovations and increased performance (Bouwman et al., 2018).

E-government is an effective tool to reduce corruption by promoting good governance and strengthening reform-oriented actors. Specifically, e-government can reduce corrupt behaviors externally by enhancing relationships with citizens and internally by more effectively controlling and monitoring employees' behaviors. This study examines the impact of e-government on corruption using national level data. The impacts of other traditional factors – bureaucratic professionalism, bureaucratic quality, and law enforcement – proposed by the public administration literature are also examined. Statistical analysis reveals that e-government has a consistently positive impact on reducing corruption, as do the traditional anti-corruption factors (Dong Chul Shim & Tae Ho Eom, 2008).

In all national policies myths of technological inevitability, a new and better government, rational information planning, and empowerment of the intelligent citizen can be discerned. Although the mobilizing powers of these myths are acknowledged, we conclude that existing empirical studies have generated little support for the inescapable telos of these myths, which makes canvas cleaning effects of e-government initiatives less likely (Bekkers & Homburg, 2007).

In Kazakhstan, only one of the components of informational society was accentuated; it is the formation and development of e-government, which has been successfully implemented. However, the problem of informational society is broader than just the development of e-government and the telecommunications industry.

Available data substantiates that the initiative faces several challenges such as political support and relationship between political institutions, bureaucracy and citizens, digital divide, widespread corruption, lack of human resources, and inadequate infrastructural development, which needs to be amputated to improve public service delivery (Bhuiyan, 2009).

Digitalization, focusing on not individual ICTs but the application of these technologies to entire value chains, is a theme that cuts across all of our work. In youth entrepreneurship, we are fostering a new breed of young ICT 'agripreneurs'. In climate-smart agriculture multiple projects provide information that can help towards building resilience for smallholder farmers (Tsan et al., 2019).

Digitalization can maximize the impact of these strategic initiatives to significantly reduce the impact of meat production and simultaneously drive

economic benefits by applying best practices up to 25%, meat waste -10%, consumption shift away from beef -28%, precision feeding -13%, smart animal wealth and health care -2.5% (Deloiite, 2017).

In accordance with calculations, "Akmola Phoenix" JSC, "Naydorovskoye" LLP, and "Troyana" LLP can increase their gross profits with the help of digital technologies from USD 31 up to USD 54 per one hectare of wheat. If these farms are guided by all recommendations, which were submitted for them by the experts in the sphere of digitalization, then they can increase the crop yields of wheat by 25- 35 % in perspective. At the same time, they can increase such parameters as income and profits (Aitkhozhin et al., 2019)

According to the observations of the Ministry of agriculture of the Republic of Kazakhstan, on pilot sites, point farming with the use of new technologies and equipment allowed to get 2.5 times more yield. At the same time, farmers' costs have been reduced by more than 20% (Terrapoint, 2019)

Digital technologies can also help governments improve the efficiency and effectiveness of existing policies and programs, and to design better ones. For instance, freely available and high-quality satellite imagery dramatically reduces the cost of monitoring many agricultural activities. This could allow governments to move towards more targeted policies which pay (or penalise) farmers based on observed environmental outcomes. In addition to monitoring compliance with environmental policies, digital technologies enable automation of administrative processes for agriculture and the development of expanded government services, such as in relation to extension or advisory services (OECD, 2019).

**Methodology**

The basis of the article is a detailed literature review on the experience of the ongoing digital services for agriculture using Kazakhstan and Korea cases. Based on it, different data sources are used to demonstrate application of smart practices on agribusiness. Data were gathered from official and mass media platforms, research publications and textbooks. For various solutions in the process of the study appropriate qualitative and quantitative research methods have been used: monographic, analysis and synthesis, logical and abstractive constructional, etc.

**Results and Discussion**

In Kazakhstan, many innovations and reforms are taking place in the public sector, which still occupies a large share of the national economy. To develop and introduce innovations, a state program is first developed.

One such innovation is digitalization and the State Program "Digital Kazakhstan" developed for that. Digital Kazakhstan was developed for 2018-2022, provides an additional impetus for technological modernization of the country's flagship industries and will create conditions for the large-scale and long-term growth of labor productivity.

The implementation of the Program involves 141 billion tenge from the republican budget, 169 billion tenge from the funds of the quasi-public sector. According to preliminary estimates, the direct effect of the digitalization of the economy by 2025 will create an added value of 1.7-2.2 trillion tenge, thus ensuring a return on investment of 4.8-6.4 times by 2025 to the total investment, taking into account private investment.

The program will be implemented in the following five areas:

1. "Digitalization of economic sectors" – the transformation of traditional sectors of the economy of the Republic of Kazakhstan using breakthrough technologies and opportunities that will increase labor productivity and lead to an increase in capitalization.

2. "Transition to the digital state" – the transformation of the state's infrastructure to provide services to the public and business, anticipating their needs.

3. "Implementation of the Digital Silk Road" – the development of a high-speed and secure infrastructure for the transfer, storage, and processing of data.

4. "Development of human capital" – transformations encompassing the creation of a creative society and the transition to new realities – the knowledge economy.

5. "Creating an innovative ecosystem" – creating conditions for the development of technological entrepreneurship with sustainable links between business, the scientific field, and the state, as well as the introduction of innovations in production.

In 2006, for the first time in Kazakhstan, the e-gov.kz is introduced – the portal of "e-government". The availability of public services in the online format was made possible by providing citizens with electronic digital signatures (EDS) on a free basis. The EDS allows you to receive the necessary public services and certificates without leaving home.

The Users of the e-gov portal today are more than 6 million people. Through its infrastructure, it is possible to implement 760 electronic services and services.

*Public services*

Electronic government. Further increase of transparency, accountability and efficiency of state bodies is connected with the development of the "Open Government" of Kazakhstan. It consists of five components:

– "Open data" is a site where publicly available data of state bodies are placed, as well as the results and plans of their work;

– "Open NAP" is a single platform for people's discussion of the regulatory and legal acts being developed;

– "Open Dialogue" is a platform for establishing effective feedback between state bodies and society;

– "Evaluation of the effectiveness of government agencies" provides an opportunity for citizens to participate in a public discussion of the activities of state bodies;

– "Open budgets" contribute to public control over the use of budgetary funds.

Public procurements. Since 2010, government purchases are being launched through the portal goszakup.gov.kz in real-time. This ensures the transparency of the process and the effectiveness of using budgetary funds. The system allows you to enter into electronic contracts, conduct procurement procedures, determine the supplier, publish information about contracts concluded and the results of their execution.

Licensing. Since 2012, Kazakhstanis can receive all kinds of licenses and permits on the portal E license.kz.

Taxpayer online office. On this link, https://cabinet.salyk.kz/ taxpayers can submit tax payment forms and pay taxes using their EDS, search for tax debt, submit declarations on personal income taxes and real estate (normally for public officials), etc.

Judicial online office. A single window for access to electronic services of judicial bodies, office. sud.kz is intended for filing electronic applications, petitions, and complaints in civil and criminal cases. Also, users of e-gov can enter the "Trial Cabinet" without authorization.

E-Health. Since 2015, the population has increased access to open medical databases. On the e-gov portal, the services "Calling the doctor at home", "Recording to the doctor" and "Attaching to the medical organization" are automated. And through the portal of the Bureau of Hospitalization, the patient receives information about free beds in any hospital in the country for the next three days. If the patient has already received a referral from the doctor with a code for hospitalization, he can view the current waiting lists for regional and republican clinics and track his order.

Today, the digital center "Digital Center" has registered biometric data of 1220 citizens, which allows them the opportunity to receive services without presenting identity documents. The center provides remote video services, residents of the capital can learn digital literacy skills there.

For development of innovative eco infrastructure within the Digital Kazakhstan Program the Astana hub was created.

The Astana Hub is an international technology park for IT startups. Here conditions are created for the free development of Kazakhstan and foreign technology companies.

The official opening of the MOST Business Incubator took place on September 25, 2015. It is the first private business incubator in the country that supports start-up entrepreneurs at all stages of business development – from developing an idea to its implementation.

It started to be easy to buy tickets on different events and shows, air and train travels with online sources. The main problems to use this service are internet availability and IT literacy. Usually young and middle aged population is top users of online purchase.

The Flip.kz and the Meloman.kz are book purchasing online service with pick up points and delivery options. Although they sell also dishes, souvenirs and other commodities to diversify assortment and attract different buyers.

Kundelik.kz is an electronic journal for keeping grades of schoolchildren. For university students, Platonus online web platform with internal logins is used across Kazakhstan.

Bilim Media Group is an innovative company building the e Learning market in Kazakhstan. They create and distribute e-content with on – demand technology and service to deliver content to the end- user instantly. Their clients range from home consumers, governmental institutions, media organizations, and key educational institutions.

EDTECH publishes training materials for preparation for UNT and CTA for schools, colleges and educational centers of Kazakhstan. EDTECH organizes tests for more than 100 000 graduates of high school in Kazakhstan.

Openu.kz is an educational platform offering free access to online courses for students in Russian and Kazakh.

As part of the project, the best textbooks of the world's leading universities in history, philosophy, sociology, psychology, anthropology, cultural studies, religious studies, linguistics, innovation, media, economics, management, and business are translated into Kazakh.

I-teka is the one -stop platform for searching drugstores, medicines, clinics and doctors by local areas.

Portal about medicine (zdrav.kz) is a popular technological product of electronic medicine that provides the broadest access of the population to the most up-to-date information on physical activity, proper nutrition, what should be done in case of illness, on methods for their early detection and treatment, as well as on doctors and medical organizations of Kazakhstan and foreign countries.

A list of clinics (https://polikliniki.kz/) is the one-stop search engine for all clinics and their contacts around Kazakhstan. Notable to say that each clinic already has own website to provide information about their services and doctors.

A list of doctors (idoctor.kz) provides information about the contact details and names of doctors with feedback from patients.

"University Medical Center" Corporate Fund was founded under the decision of the board of trustees of the autonomous organization of education "Nazarbayev University" dated 20 September 2015.

The purpose of the system is to promote the healthcare of Kazakhstan through the integration of clinical, educational and research activities. This integration has enormous advantages; it will contribute to the provision of modern medical education and will act to raise the standards of healthcare, focused on the patient and his family, at UMC Centers. UMS website provides information about its services and doctors by the competitive market price.

Therefore, all mentioned web recourses were created to better medical literacy for citizens and provide one- stop online platform for their medical needs. The one mentioned problem with them, websites needed updates and everyday monitoring to keep the attraction of customers.

Social media in Kazakhstan has turned the communication "from the government to citizens" upside down. Today, any active citizen can become a source of news and content, and get wide coverage. Technologically savvy young people are interested in democracy, personal space, human rights, and other issues of civil society. In September, President Kassym-Zhomart Tokayev in his first message to the people of Kazakhstan announced the transition to the concept of a "hearing state" in terms of establishing an effective system of communication with the public and business.

What are the benefits of Digital Kazakhstan for business? Unambiguously, simplifying the design and procedures for registration, obtaining information data, public services, using a more developed innovative ecosystem, business, along with the population, improves its functioning. As we see from the Digital Kazakhstan program, the main emphasis is on the state and quasi-public sector – services and industries, such as egov – a single portal of public services, an electronic database, etc.

Digitalization is the use of digital technology to change the business model and provide new opportunities for profit and value creation; it is a process of transition to digital business.

According to the analysis of BCG (Boston Consulting Group), B2C sectors are historically leading in the implementation of digital technologies: for example, the media, in which fundamental changes have already taken place, as well as retail, telecommunications, insurance, and banking.

In Kazakhstan, digitalization has begun to be implemented in state-owned companies and private large organizations. One of these is the Kazpost Joint Stock Company – a Kazakhstan company, the operator of the Kazakhstan national postal network. Service post.kz is an online branch of Kazpost. Since the launch in 2016, more than 1 million customers have already used it. The site allows you to find a convenient location of the post office, change the delivery address of the parcel, calculate the cost of delivery, pay for any services and even make money transfers.

The Government of Kazakhstan understands the importance of automating business processes to improve the quality of tax administration.

This direction provides for the implementation of three projects under the Digital Kazakhstan program:

- The project "VAT administration using Blockchain technology";
- The project "Traceability of goods";
- The project "Increasing tax collection by integrating databases of various sources".

Management organization. During the organization of management, the traditional business of the XXth century used a linear-functional organizational structure of management, where managers were appointed by the levels of management (higher-middle-lower-level) and employees were concentrated in functional departments that performed narrow specific functions.

Management practices are currently changing. Companies of innovative profile (IT, research development) or supporting innovative management methods are looking for quick and effective methods. Agile (English-agile) appeared as an approach to software development in the United States in the 90s of the last century. It turned out that cross-functional self-organizing teams working with small iterations on the overall result are much more effec-

tive than the traditional method of working with functional departments.

Agile is a small team, various specialists, small tasks, a real result. Only 1-2% of Kazakhstani companies use the Agile approach, although the potential is huge.

The most popular approaches were Scrum and Kanban.

The basis of Scrum is short sprints, usually 2-3 weeks. Before the start of the sprint, the team itself creates a list of tasks for iteration, then the sprint starts.

Kanban (kahn-bahn) is a Japanese word; in translation, this means "visible record" or "visible part". The Kanban system requires production only when there is a demand for products.

To ensure the successful implementation of the Kanban system, certain factors should be considered, such as inventory management, the involvement of sellers and suppliers, quality improvement and quality control, as well as the commitment of employees and senior management.

In the Kazakhstani market in the banking and retail sectors, the introduction of Agile has begun. M. Zhunusov, Eurasia Digital Hub, Beeline, among the changes with the introduction, noted that the slow classical workflow has moved towards structured rituals, also, self-organized teams have reduced the participation of management in operational tasks. 25% fewer letters and 40% fewer meetings.

Organization of accounting. In general, digitalization leads to a single unified use in the accounting and analysis of digital information and communication technologies. At the moment, the intellectual information technology in accounting is the 1C: Enterprise program. The 1C: Enterprise program system includes a platform and application solutions developed on its basis for automating the activities of organizations and individuals.

Blockchain. Experts say that in the next five years, blockchain will change not only the global economy but also everyday life. In Kazakhstan, a draft law is being prepared to regulate blockchain technologies, the introduction of which will also greatly help society get rid of bureaucracy and corruption.

Today we all use a decentralized platform for transmitting information – the Internet. But when it comes to the transfer of values (money), we are forced to resort to the services of old-fashioned, centralized financial institutions such as banks. Even modern online payment methods usually require the user to integrate with a bank account or credit card. Blockchain technology offers an intriguing opportunity to eliminate these intermediaries.

It keeps track of transactions, identifies the parties and concludes contracts. Traditionally, financial institutions and banks were responsible for these operations.

Cash payments. For the digitalization program of the country's economy, small shops threaten to become an impregnable fortress. For many years, the state has been making efforts to transfer their accounting and settlements to the legal field, but so far there have been no obvious successes in this matter.

Speaking about small businesses, first of all, we must keep in mind the huge army of shops near the house – there are about 500 thousand of them all over the country. Another 100 thousand are small participants in online trading. Thus, the total number of trade participants hiding their turnover is about 600 thousand tenge.

It is generally accepted that the reason that forces them to work with cash payments is simply a reluctance to pay taxes. However, no exact studies on this topic have been conducted in the country.

The Chamber of Entrepreneurs Atameken has recently launched the Council for the Development of Startups and the IT Ecosystem.

According to A.Datkaev, general director of Smart Production LLP, the market offers two convenient solutions.

The first is a mobile online cash register operating via a smartphone, with which you can register any payments for cash, the connection price is 16 thousand tenge. The second is a mobile terminal for cashless payments, also working through a smartphone. Its convenience is that any transactions can be carried out in any place where there is a telephone connection, the price is 12 thousand tenge. The use of applications implies technical support and SMS notification, for which the entrepreneur pays 1000 tenge per month.

Both programs do not require downloading special programs, they work through the installed browser after activating the purchased program code. During the year of the offer, a mobile cash register was bought 1000 times, a mobile terminal for cashless payments – 9000. Moreover, applications are 5 times cheaper than any other analoge.

An analog of this product is webkassa- an online cash register for accounting fiscal operations. It is controlled from a smartphone, brands the checks, transfers them via WhatsApp. The online cash desk is automatically integrated with the most popular accounting systems in Kazakhstan. The monthly subscription fee for using the product is 3 K KZT.

It should be noted that online cash registers will only work if business entities are connected to the Kazakhtelecom OFD (fiscal data operator), which

must pay 1,500 tenge for online data transfer to the tax service. / month at the cash register, but this payment is available for all cash registers without exception.

At the same time, other technical solutions appear in the Kazakhstan market, such as reKASSA, the only mobile free cash register in Kazakhstan offered by COMRUN LLP.

reKASSA is included in the state register of the Republic of Kazakhstan of controlling cash registers under No. 235 and has the functions of X and Z reports, returns, cancellation of a check, purchase mode, etc. The reKASSA application can be said through any smartphone. In November 2019 this application has been installed over 10 thousand times.

The world experience of countries with developed agrarian sectors indicates that the introduction of IT technologies in production can reduce unplanned costs by up to 20% or less using innovative software that consolidates data arrays from equipment, sensors, drones, satellite and other external applications for making optimal decisions.

New technologies make it possible to trace the entire path of product promotion from the field to the consumer, which guarantees its quality and meets the needs of the client.

The development of digital technologies is attracting new jobs or business related with the digitalization. In terms of environmental sustainability, the potential impact of technologies, such as IoT, is relevant in reducing water consumption or pesticides and fighting against climate change. Another relevant perspective are the social issues, agricultural exploitations are located in rural regions, and smart agriculture development can help to attract population (social sustainability). Therefore, the development of smart agriculture is essential for several reasons and public institutions are working on the diffusion of the benefits between different stakeholders (Pesce et al., 2019)

In Kazakhstan, the state program E-APK has been developed. According to it, labor productivity growth in the section "Agriculture, forestry and fisheries" in 2022 must achieve 45.1%. State budget expenditure was planned for 2018-2022 at 335 829 492 USD. It was not identified in the document the share of that spending only for agriculture though.

In the course of its implementation, the following problems in agriculture have been identified:

– Inadequate business learning coverage;

– There is no single point of obtaining complete information (technology, research, scientific achievements);

– There is no structured information about world experience and modern technologies;

– The complex, lengthy and corrupt land acquisition process;

– The long and non-transparent loan process;

– Opacity of subsidies;

– Weak labor market activity in the agricultural sector and insufficient staff;

– Insufficiency of information about seeds / fertilizers / livestock / technologies;

– Irrational use of seeds, fertilizers, plant protection products;

– Lack/misuse of equipment;

– Lack of data on agrochemical analysis, space monitoring, accurate weather data;

– Inadequate development of phytosanitary and veterinary medicine;

– Lack of information on methods for sorting and packaging agricultural products;

– Weak logistics, lack of equipment in the seasonal period;

– There are no free vaults/warehouses;

– The prolonged customer search process;

– Opaque veterinary activities.

In 2018, 12 farms and 3 poultry farms received digital status, and 12 livestock farms became smart farms. Thus, the total number of Kazakh agricultural enterprises where production is automated using computer systems has reached 49 (Ministry of agriculture of Kazakhstan, 2019).

To date, 24 million hectares of arable land have been digitized, almost 100% of the total sown area. Also, work has begun on digitizing pastures. Farm productivity is boosted by technologies such as:

– forecasting the optimal time for harvesting;

– "smart watering";

– the intelligent mineral fertilizer application system;

– pest and weed control system.

In the digitalization of agriculture in Kazakhstan, Akmola, Kostanai, and Karaganda regions are leaders. Naydorovskoe LLP is so far the best economy example of the Karaganda region. It is notable for its high results in introducing advanced technologies and in crop yields. It is worth noting that this is the first farm in the Karaganda region that began a three-year process of certification of part of its fields for organic farming. A land plot of 3000 hectares was allocated and a separate Neue Dorf organic farm LLP was created.

As the successfully introduced digital technologies, one can cite an example of their introduction in agriculture at the Rodina agricultural firm, a producer of domestic milk for the markets of Northern and Central Kazakhstan. To enter the factory, fingerprints are used, which are stored in a database.

The control of technological processes for the reception of milk, the work of a pasteurizer, separator, tankers to create kefir, sour cream, fermented baked milk, snowball is also carried out using a centralized computer network.

In 2014, Atameken Agro began research in the field of agriculture to automate and develop technical capabilities, and in 2015, it introduced a remote sensing system and satellite monitoring of crops.

Online sales of grain crops in 2018 exceeded 10 million tons, and over the entire implementation period amounted to 24 million tons per 1 trillion. tenge.

Subsidies for agriculture are already being provided online for 11 types, in the future to expand this range in Kazakhstan.

However, the issuance of soft loans, which is of particular importance for agribusiness as a means to increase the volume and lines of activity, is still outside the online system. Numerous trips from villages to districts, regional centers for obtaining loans, the length of the period for obtaining soft loans take time, farmers' financial resources. Therefore, we believe that this direction should take priority for the digitalization of agriculture.

From time to time, farmers face problems in working with new technologies. For the introduction of technologies to be successful and productive, agricultural workers attend free consultations. Farmers are trained in the use of new technologies based on precision farming landfills: Kaskelen Agropark, Grain Institute named after A.I. Barayev, Zarechny LLP and Kazakh National Agrarian University. And by 2020, farmers will have the opportunity to take online courses in entrepreneurship, farming, agronomy and livestock farming.

*ICT support policy for the livestock sector in Korea.* On the basis of the Special Act on Assistance to Farmers, Fishermen, ETC., following the Conclusion of Free Trade Agreements in 2009, the Korean government has carried out support measures for the stabilization of livelihood of farmers by improving the competitiveness of agriculture. For livestock farmers, these measures aim to launch, so called "the Intelligent Feeding and Management System" that incorporates optimized feeding and management. The system includes the application of smart animal husband to raise the productivity by 20%. The productivity increase is measured by production volumes and quality. Table 1 shows governmental subsidies and loans under the system.

Korean farmers and retail has been introducing smart technology not only in rural areas but in urban environment as well. The result is a highly productive "vertical" metrofarm that produces 30kg of vegetables per day at a rate that is 40 times more efficient than traditional farming. In the adjacent cafe, as many as 1,000 customers a day now purchase salads, smoothies and edible flowers grown next door in a full seed-to-table operation (BBC, 2020).

**Table 1** – State support for smart livestock in Korea, mln USD

| | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| Subsidy | 8 | 15 | 20 | 30 |
| Loan | 13 | 25 | 33 | 50 |
| Total | 21 | 40 | 53 | 80 |
| Source: Ministry of Agriculture, Food and Rural Affairs, 2020 | | | | |

According to estimates by the McKinsey & Company analytical center, 1/3 of all food products in the world (up to $ 940 billion per year) are lost or waste. It is digitalization that will reduce these losses.

According to studies by the FAO Food and Agriculture Organization (UN), annual grain losses amount to 30% of total production. The world average is 10%, and in the CIS countries (including Kazakhstan) – up to 25%.

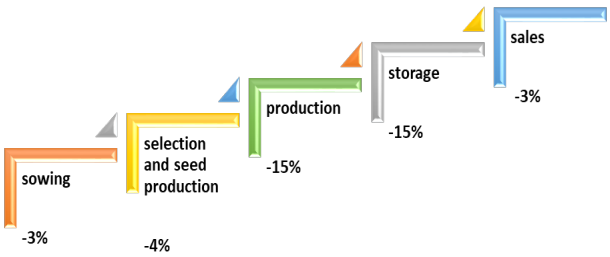


**Figure 1** – Losses of grain on the supply chain
Source: terrapoint.kz

Thus, digitalization in Kazakhstan to solve business problems to increase the speed of processing procedures for state registration, other public services, accounting, cash transactions, etc. has begun. 310 billion tenge are allocated from the budget throughout the entire implementation period.

Private companies in the IT industry are also joining the digitalization process in response to market demand. This process requires the cooperation of all branches of knowledge, scientists, technical experts, development and research companies, and public-private partnerships, especially in vulnerable sectors of the economy – agriculture, secondary education, rural development.

To reduce administrative barriers, corruption, the efficiency of operations at the state and business levels, digital solutions are the way to our progressive development.

## Conclusion

Digitalization is the use of digital technology to change the business model and provide new opportunities for profit and value creation; it is a process of transition to digital business.

State program called Digital Kazakhstan was developed for 2018–2022, provides an additional impetus for technological modernization of the country's flagship industries and creates conditions for the large-scale and long-term growth of labor productivity.

There are the benefits of Digital Kazakhstan for business. Unambiguously, simplifying the design and procedures for registration, obtaining information data, public services, using a more developed innovative ecosystem, business, along with the population, improves its functioning.

According to estimates, 1/3 of all food products in the world (up to $ 940 billion per year) are lost or waste. Due to high density of population and settlements in Kazakhstan frequent business trip and offline communications become costly for entrepreneurs and consequently for customers who buy their end products. It is expected that digitalization that will reduce these losses.

Global emergencies, such as COVID-19 forced states to convert most of their services from offline to online. So did the business. By doing so many issues revealed to tackle with like internet access, communication score and scope, reliable and capable online platform, informational literacy level etc.

The digitalization process requires the cooperation of all branches of knowledge, scientists, technical experts, development and research companies, and public-private partnerships, especially in vulnerable sectors of the economy – agriculture, secondary education, rural development. In order to make sustainable agriculture development Kazakhstani farmers, professional and public organizations and Ministry of agriculture must work together to apply digitalization decisions case it not just fashion and spending budget funding's but also it about increasing productivity on farm-side, better services for customers, safer environment.

For transparent monitoring of the state budget for digitalization target indicators connected with expenditure we recommend to make state authorities report on that matter available for public disclosure on digital platforms with creating mixed commission from members of professional unions in agriculture, parliament and farmers. In order to ease controlling of budget for digitalization of agribusiness we advise to divide it by target indicators, for instance precision agriculture technologies, health monitoring, feeding etc. with disclosure of that numbers in state agriculture development program for next 5-year-period.

We consider that every industry itself through regional branches should develop propaganda and educational resources to make sure that entrepreneurs aware and skillful to use online services. Remote economies should be provided with available physically and financially with internet of things. In order to comply with Digital Kazakhstan initiative, we believe that informational-communication market must be competitive and well presented, based on government-private partnership and antimonopoly. Government expenditures spent for that must be transparent and decisions made to some extent participative for stakeholders both business and customers.

**References**

Aitkhozhin S.K., Balkibayeva A.M., Ramazanova R.H., Yermekov F.K., Karsybayeva K.A. Economic assessment of precision agriculture project in Kazakhstan // Periódico Tchê Química. – 2019. – Vol. 16. – P. 304-314.

Agile: лекарство от всех болезней? – 2019. https://profit.kz/news/48619/Agile-lekarstvo-ot-vseh-boleznej/.

Bouwman H., Nikou S., Molina-Castillo F., de Reuver M. The impact of digitalization on business models // Digital Policy, Regulation and Governance. – 2018. – Vol. 20. No. 2. – P. 105-124. https://doi.org/10.1108/DPRG-07-2017-0039.

Цифровые технологии в сельском хозяйстве. – 2019. http://terrapoint.kz/news/section/internet_veshchey_v_selskom_khozyaystve.

Цифровизация сельского хозяйства: умные фермы. – 2019. https://www.inform.kz/ru/cifrovizaciya-sel-skogo-hozyaystva-umnye-fermy_a3454293.

Delloitte. Smart livestock farming. – 2017. https://www2.deloitte.com/content/dam/Deloitte/de/Documents/operations/Smart-livestock-farming_Deloitte.pdf

Dong Chul Shim & Tae Ho Eom. E-Government and Anti-Corruption: Empirical Analysis of International Data // International Journal of Public Administration. – 2008. – vol. 31(3). – P. 298-316. DOI: 10.1080/01900690701590553.

Ковалев Г. Когда оцифруют малый бизнес. – 2019. https://kapital.kz/gosudarstvo/69906/kogda-otsifruyut-malyy-biznes.html.

Государственная Программа “Цифровой Казахстан”. https://digitalkz.kz/o-programme/

Gartner Glossary. – 2019. https://www.gartner.com/en/information-technology/glossary/digitalization.

Musilimova K.S., Alzhanova A.N. Electronic government of the Republic of Kazakhstan: the history of formation and development // Bulletin of the Karaganda university. – 2015. https://articlekz.com/en/article/14398.

Коротченко Н. Блокчейн для чайников. – 2017. https://ru.ihodl.com/tutorials/2017-02-06/blokchejn-dlya-chajnikov-chto-nuzhno-znat-o-revolyucionnoj-tehnologii.

Kwon Moon. Is underground farming the future for food? – 2020. http://www.bbc.com/travel/story/20200723-is-underground-farming-the-future-of-food?referer=https%3A%2F%2Fwww.bbc.com%2F.

Kumar V. JIT based quality management: concepts and implications in Indian context // International Journal of Engineering Science and Technology. – 2010. – Vol. 2. – P. 40-50.

Кумыспаева Н., Бовкис В. Блокчейн внедряют в Казахстане. – 2019. https://khabar.kz/ru/news/item/110590-blokchejn-vnedryayut-v-kazakhstane.

16 «цифровых» крестьянских хозяйств и 6 smart-ферм появилось в РК в 2019 году. – Министерство сельского хозяйства РК, 2019. https://www.gov.kz/memleket/entities/moa/press/news/details/16-cifrovyh-krestyanskih-hozyaystv-i-6-smart-ferm-poyavilos-v-rk-v-2019-godu-msh?lang=ru.

Tsan M. et al. The digitalization of African agriculture report 2018-2019. https://www.cta.int/en/digitalisation/all/issue/the-digitalisation-of-african-agriculture-report-2018-2019-sid0d88610e2-d24e-4d6a-8257-455b43cf5ed6.

New technologies and digitalization are transforming agriculture and offering new opportunities to improve policy. – OECD, 2019. https://www.oecd.org/agriculture/topics/technology-and-digital-agriculture/.

Программа Е-АПК. – 2018. https://moa.gov.kz/ru/documents/156.

Президенту Казахстана показали, как работает цифровой ЦОН. – 2019. https://news.mail.ru/politics/39557220/?frommail=1.

Постановление Правительства Республики Казахстан от 12 декабря 2017 года № 827 Об утверждении Государственной программы «Цифровой Казахстан». https://online.zakon.kz/document/?doc_id=37168057& doc_id2=37168057#pos=49;-108&pos2=1387;-48.

Pesce M., Kirova M., Soma K., Bogaardt M.J., Poppe K., Thurston C., Wolfert S., Beers G., Monfort C., Urdu D. Research for AGRI Committee – Impacts of the Digital Economy on the Food-Chain and the CAP. – Brussels: European Parliament, Policy Department for Structural and Cohesion Policies, 2019.

Surendra M.G., Yousef A.Y., Ronal F.P. Flexible Kanban system // International Journal of Operations and Production Management. – 1999. – vol. 19, No. 10. – P.1065-1093.

Basu S. E-government and developing countries: an overview // International Review of Law, Computers & Technology. – 2004. – Vol. 18(1). – P. 109-132. DOI: 10.1080/13600860410001674779.

Bhuiyan S. E-Government in Kazakhstan: Challenges and Its Role to Development // Public Organization Review. – 2009. – Vol. 10(1). – P. 31-47.

Джаненова С. Почему Казахстану важно стать слышащим государством. – 2019. https://vlast.kz/avtory/36231-pocemu-kazahstanu-vazno-stat-slysasim-gosudarstvom.html?utm_source=email&utm_medium=metro&fbclid=IwAR2HPbChfKeqrVtv8w7RiCNSdZx_tIMGpUSCYqxD7mig2PNCttXEI6zEmsE.

Спецпроект Корпорация совместно с АО «Самрук-Казына». – 2019. https://vlast.kz/corporation/24539-cifrovizaciya-biznesa.html.

В Казахстане идет цифровая трансформация агрокомплекса. – 2020. https://profit.kz/articles/14598/V-Kazahstane-idet-cifrovaya-transformaciya-agrokompleksa/.

Bekkers V., Homburg V. The Myths of E-Government: Looking Beyond the Assumptions of a New and Better Government // The Information Society. – 2007. – Vol. 23(5). – P. 373-382. DOI: 10.1080/01972240701572913

**References**

Agile: lekarstvo ot vseh boleznej? [Agile: a cure for all diseases?] (2019) https://profit.kz/news/48619/Agile-lekarstvo-ot-vseh-boleznej/.

Aitkhozhin S.K., Balkibayeva A.M., Ramazanova R.H., Yermekov F.K., Karsybayeva K.A. (2019) Economic assessment of precision agriculture project in Kazakhstan. *Periódico Tchê Química*, vol. 16, pp. 304-314.

Basu S. (2004) E-government and developing countries: an overview. *International Review of Law, Computers & Technology*, vol. 18(1), pp. 109-132. DOI: 10.1080/13600860410001674779.

Bekkers V., Homburg V. (2007) The Myths of E-Government: Looking Beyond the Assumptions of a New and Better Government. *The Information Society*, vol. 23(5), pp. 373-382. DOI: 10.1080/01972240701572913.

Bhuiyan S. (2009) E-Government in Kazakhstan: Challenges and Its Role to Development. *Public Organization Review*, vol. 10(1), pp. 31-47.

Bouwman H., Nikou S., Molina-Castillo F., de Reuver M. (2018) The impact of digitalization on business model. *Digital Policy, Regulation and Governance*, vol. 20, No. 2, pp. 105-124. https://doi.org/10.1108/DPRG-07-2017-0039.

Cifrovizacija sel’skogo hozjajstva: umnye fermy [Digitizing Agriculture: Smart Farms] (2019). https://www.inform.kz/ru/cifrovizaciya-sel-skogo-hozyaystva-umnye-fermy_a3454293.

Cifrovye tehnologii v sel’skom hozjajstve [Digital technologies in agriculture] (2019). http://terrapoint.kz/news/section/internet_veshchey_v_selskom_khozyaystve.

Delloitte (2017) Smart livestock farming. https://www2.deloitte.com/content/dam/Deloitte/de/Documents/operations/Smart-livestock-farming_Deloitte.pdf.

Dong Chul Shim & Tae Ho Eom (2008) E-Government and Anti-Corruption: Empirical Analysis of International Data. *International Journal of Public Administration*, vol. 31(3), pp. 298-316. DOI: 10.1080/01900690701590553.

Dzhanenova S. (2019) Pochemu Kazahstanu vazhno stat' slyshashhim gosudarstvom [Why is it important for Kazakhstan to become a listening state]. https://vlast.kz/avtory/36231-pocemu-kazahstanu-vazno-stat-slysasim-gosudarstvom.html?utm_source=email&utm_medium=metro&fbclid=IwAR2HPbChfKeqrVtv8w7RiCNSdZx_tIMGpUSCYqxD7mig2PNCttXEI6zEmsE.

Gartner Glossary (2019) https://www.gartner.com/en/information-technology/glossary/digitalization.

Gosudarstvennaja Programma "Cifrovoj Kazahstan" [State Program "Digital Kazakhstan"] (2017). https://digitalkz.kz/o-programme/.

Korotchenko N. (2017) Blokchejn dlja chajnikov [Blockchain for Dummies]. https://ru.ihodl.com/tutorials/2017-02-06/blokchejn-dlya-chajnikov-chto-nuzhno-znat-o-revolyucionnoj-tehnologii.

Kovalev G. (2019) Kogda ocifrujut malyj biznes [When small business is digitized]. https://kapital.kz/gosudarstvo/69906/kogda-otsifruyut-malyy-biznes.html.

Kumar V. (2010) JIT based quality management: concepts and implications in Indian context. *International Journal of Engineering Science and Technology*, vol. 2, pp. 40-50.

Kumyspaeva N., Bovkis V. (2019) Blokchejn vnedrjajut v Kazahstane [Blockchain is being implemented in Kazakhstan]. https://khabar.kz/ru/news/item/110590-blokchejn-vnedryayut-v-kazakhstane.

Kwon Moon (2020) Is underground farming the future for food? http://www.bbc.com/travel/story/20200723-is-underground-farming-the-future-of-food?referer=https%3A%2F%2Fwww.bbc.com%2F.

Ministry of agriculture of Kazakhstan (2019) 16 «Cifrovyh» krestyanskih hosyastv i 6 smart-ferm poyavilos v RK v 2019 godu [16 "digital" peasant farms and 6 smart farms appeared in Kazakhstan in 2019]. https://www.gov.kz/memleket/entities/moa/press/news/details/16-cifrovyh-krestyanskih-hozyaystv-i-6-smart-ferm-poyavilos-v-rk-v-2019-godu-msh?lang=ru.

Musilimova K.S., Alzhanova A.N. (2015) Electronic government of the Republic of Kazakhstan: the history of formation and development. *Bulletin of the Karaganda university*. https://articlekz.com/en/article/14398

OECD (2019) New technologies and digitalisation are transforming agriculture and offering new opportunities to improve policy. https://www.oecd.org/agriculture/topics/technology-and-digital-agriculture/.

Pesce M., Kirova M., Soma K., Bogaardt M.J., Poppe K., Thurston C., Wolfert S., Beers G., Monfort C., Urdu D. (2019) Research for AGRI Committee – Impacts of the Digital Economy on the Food-Chain and the CAP. Brussels: European Parliament, Policy Department for Structural and Cohesion Policies.

Postanovlenie Pravitel'stva Respubliki Kazahstan ot 12 dekabrja 2017 goda № 827 Ob utverzhdenii Gosudarstvennoj programmy «Cifrovoj Kazahstan» [Resolution of the Government of the Republic of Kazakhstan dated December 12, 2017 No. 827 On approval of the State Program "Digital Kazakhstan"]. https://online.zakon.kz/document/?doc_id=37168057&doc_id2=37168057#pos=49;-108&pos2=1387;-48.

Prezidentu Kazahstana pokazali, kak rabotaet cifrovoj CON [The President of Kazakhstan was shown how the digital public service center works] (2019). https://news.mail.ru/politics/39557220/?frommail=1.

Programma E-APK [E-APK program] (2018). https://moa.gov.kz/ru/documents/156

Specproekt Korporacija sovmestno s AO «Samruk-Kazyna» [Special project Corporation jointly with Samruk-Kazyna JSC] (2019). https://vlast.kz/corporation/24539-cifrovizacia-biznesa.html.

Surendra M.G., Yousef A.Y., Ronal F.P. (1999) Flexible Kanban system. *International Journal of Operations and Production Management*, vol. 19, No. 10, pp. 1065-1093.

Tsan M. et al. (2019) The digitalization of African agriculture report 2018-2019. https://www.cta.int/en/digitalisation/all/issue/the-digitalisation-of-african-agriculture-report-2018-2019-sid0d88610e2-d24e-4d6a-8257-455b43cf5ed6.

V Kazakhstane idet cifrovaya transformaciya agrobusinessa [In Kazakhstan, the digital transformation of the agricultural complex is underway]. https://profit.kz/articles/14598/V-Kazahstane-idet-cifrovaya-transformaciya-agrokompleksa/.