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Features and public financing of digitalization and E-Government: The case of Kazakhstan

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Abstract: In Kazakhstan, for more than 20 years, the state policy on the formation of a single information space, aimed at reducing budgetary resources for the formation and maintenance of information resources of government agencies, as well as the creation of a unified communication environment. The relevance of the article is due to the following factors: the acceleration of digital modernization processes in Kazakhstan under the influence of global informatization and the consideration of the prospects of improving the efficiency of the Kazakh government through the introduction of information technology is not always recognized by society as an institutional advantage. As special methodological tools, the study used experimental, empirical and heuristic methods to analyze factors and identify problems in budget financing in the field of digitalization and E-Government in Kazakhstan. The main source of data is the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. The main conclusions: there is a need for further economic and political modernization of Kazakh society through the widespread use of information technology, and in our view, the practical approach to the use of public financing to create a real e-government and the prospects for its development in Kazakhstan is interesting.

Keywords: Kazakhstan; government funding; digitalization; E-Government; information technology; rating of Kazakhstan

1. Introduction

In today's world, the Internet economy is growing at a rate of 25% a year, even in developing countries, 90% of all global data has been created in the last 5 years. Already 35 billion devices are connected to the Internet and exchange data—a figure five times greater than the total world population. The ongoing digitalization is creating a new society where human capital is actively developing—the digital knowledge and competencies of the future are nurtured from childhood, business efficiency and speed are increasing through automation and other new technologies, and the dialogue of citizens with their states, first, is being transferred to the virtual space, and second, should become increasingly simple, open and intuitive.

These changes are caused by the introduction in recent years of a multitude of technological innovations used in different sectors. The way we produce and add value is changing dramatically, and there are new demands on people's education and work skills. Big data and ubiquitous connectivity are some of the factors behind the “collaborative consumption economy” that is spreading globally at an accelerated pace. The leading companies in the “collaborative consumption without physical

assets” segment are more capitalized than traditional companies with multibillion-dollar physical assets on their balance sheets. This change is radical and happens in a matter of years or even months, not decades as it used to. The process of digitalization is now affecting almost every country in the world. At the same time, each country determines its own priorities for digital development. More than 15 countries are currently implementing national digitalization programs. China, Singapore, New Zealand, South Korea and Denmark are at the forefront of the digitalization of national economies. China in its “Internet Plus” program integrates digital industries with traditional ones, Canada has created an ICT (Information and Communication Technology) hub in Toronto, Singapore is forming a “Smart Economy” with ICT as the driver, South Korea in its “Creative Economy” program focuses on human capital development, entrepreneurship and the spread of ICT achievements, while Denmark is focusing on digitalization of the public sector.

The state can provide a “digital leap” in the country through the accelerated development of specific technologies. In such cases, the state assumes the role of investor, determining the key, most promising areas of financing, based on an assessment of long-term return on investment, competitive position, trends, and also investing in the fundamental conditions for success, such as education and retraining of personnel.

Another global trend is the “self-digitalization of the state,” i.e. the digitalization of the operations of the state and state-owned companies. Self-digitalization is a task that needs to be implemented by any state aimed at maximizing value creation in the economy, growth of prosperity, a decent place in the ratings of doing business and living standards.

There are two key areas of self-digitalization at the country level:

- Digitalization of public administration: digital document management, principles of digital by default and digital first, revision of inefficient processes. In this logic, self-digitalization covers the entire range of services: internal interaction of government agencies—G2G, interaction with citizens—G2C, interaction with business—G2B.
- Digitalization of quasi-public sector entities, which is especially relevant for countries such as Kazakhstan, where the state is still responsible in one form or another for the majority of jobs in the economy, and therefore for the growth of labor productivity. Since traditional competitive market mechanisms often do not work for such companies, measurable KPIs related to the implementation of digital transformation (implementation of Industry 4.0 technologies and corresponding value creation, % of revenue from new products, training and retraining of personnel) are developed and established.

The expediency and relevance of the development of the topic. Based on the above, government funding in the digitalization of the country and the development of e-government mechanisms is beyond doubt. In our opinion, the experience of Kazakhstan, which was able to move from 65th place to 28th place in 2022 in the UN (United Nations) global ranking on the level of e-government development since 2005 (indicators of 193 countries are taken into account) is interesting to study (United Nations Department of Economic and Social Affairs (UNDESA), 2022).

The scientific novelty of the study lies in the analysis of the effectiveness of the

use of state assets and budget financing in the field of digitalization and development of e-Government of Kazakhstan.

The purpose of the study is to identify and analyze the emerging problems on the basis of the effectiveness of the use of state assets and budget financing in the field of digitalization and development of e-Government of Kazakhstan.

The object of the study is “digital” Kazakhstan and its e-Government.

The subject of the study is the effectiveness of the use of state assets and budget financing in the field of digitalization and e-Government in Kazakhstan and the development of recommendations to improve it.

Since 2000, Kazakhstan has been pursuing an active state policy on the formation of the Common Information Space, aimed at reducing budgetary funds for the formation and maintenance of information resources of state bodies, as well as for the creation of a unified communication environment.

The basis of the information space of public authorities was to be formed by information systems capable of providing support for decision-making by public authorities both in the sphere of economic management and in the sphere of security of an individual, society and the state on the basis of management of information flows.

An important role in the creation of the information space was assigned to electronic document flow. It was supposed that the electronic document flow should be directed to servicing the relevant decision of the links of the state power system, in the course of which a chain of electronic documents was created (from analysis to impact), which forms an end-to-end management channel.

These problems were supposed to be solved through state programs in the following stages:

- 1) 2001–2005: building a strong national infrastructure.
- 2) 2005–2007: formation of “e-government” (hereinafter referred to as “e-government”) (providing citizens and organizations with quick and quality access to public services, increasing the efficiency of functioning of state bodies through a wide range of information and communication technologies).
- 3) 2008–2010: creation of the first stage of the state cloud. Transfer of state IS (Information System) and basic components of ES (Enterprise System) to the “cloud” platform.
- 4) 2010–2014: implementation and development of the architecture of “e-government”.
- 5) 2013 - 2017: implementation of the architectural approach to improve the efficiency of the public administration system.
- 6) 2018–2022: digitalization of the internal activities of government agencies transition to the “Digital State”.

Unfortunately, the continuity of statistical data, which are formed within the framework of the state program “Information Kazakhstan-2020” after the expiration of time, starting from 2001, due to the lack of proper monitoring and control, is not ensured. In the Ministry of National Economy of the Republic of Kazakhstan there is no open information on expenses on realization of state programs in the sphere of informatization since 2001. This situation was negatively affected by repeated reorganizations of state bodies, during which the procedures for the transfer of

archival files are not observed.

In 2017, as part of the implementation of the Message of the President of the Republic of Kazakhstan “The Third Modernization of Kazakhstan: Global Competitiveness”, the State Program “Digital Kazakhstan” was approved with the implementation period of 2018-2022. It should be noted that Kazakhstan is a country with active state intervention in the market economy. Partially significant results of the implementation of this program are also considered within the framework of this article.

The results of the State Program showed a positive effect on the development of economic sectors with a total economic effect in the period from 2018 to 2021—USD 3.82 billion (KZT 1,629.196 billion) and attracting USD 0.27 billion (KZT 114.8 billion) to the innovation ecosystem.

Among the achievements to date: 99% of the population is covered by the Internet, more than 90% of government services are available online, the share of large and medium-sized enterprises using elements of Industry 4.0 amounted to 5%, the infocommunication infrastructure has been expanded and the introduction of next-generation 5G mobile technology has begun, the share of e-commerce has increased from 2.2% to 5.2% in 2020, digital farms have been created to process cryptocurrencies, work continues on the creation of model factories and smart fields.

Kazakhstan’s Human Development Index is 0.811 out of 1 and according to the United Nations report, Kazakhstan is ranked 56th out of 191 countries for 2021–2022. Currently, the level of digital literacy (basic) in Kazakhstan is more than 87.3% (2020—82.1%).

The index of telecommunications infrastructure in Kazakhstan is 0.75200 out of 1 and indicates the need for its further development.

A number of elements of the innovation ecosystem have been created: the innovation cluster “Park of Innovative Technologies”, the National Agency for Development of Innovations “QazInnovations”, the autonomous educational organization “Nazarbayev University”, and the International Technopark of Information Technology Startups “AstanaHub” have been launched.

As of the beginning of 2022, there are 10,989 IT-companies operating in Kazakhstan in the IT-sphere.

As of the end of 2022, the number of information technology startups supported by technoparks, incubators and gas pedals reached 1014, and the total number of operating information technology companies in the market exceeded 7 thousand.

The amount of taxes paid by information technology companies in 2021 amounted to USD 0.287 billion (KZT 122 billion).

2. Review of literature

The European Union introduces a wide range of financial instruments to support innovative activities of enterprises in 2021–2027, associated with the increasing digitalization of the economy and the impact of Industry 4.0 (Wyrwa, 2020). The issues of economic development, taking into account regional specifics, peculiarities of the formation of economic and political associations associated with the increasing digitalization of the economy, have been repeatedly considered in the

works of economists and sociologists (Boronenko et al., 2015; Shevyakova et al., 2019, 2021; Ślusarczyk et al., 2020; Tvaronaviciene et al., 2020).

Most countries and global companies see digitalization as an opportunity to further develop Industry 4.0, but there is also an understanding of the need to improve the skills of their citizens and employees, as well as the development of their digital competencies (Dzwigol et al., 2020). However, the prospects for future labor development, worker competency profiles, and the impact on employment under the impact of the digitalization of the economy are assessed differently by different researchers (Abele et al., 2015, 2017; Monostori et al., 2016; Kagermann et al., 2013; Liker, 2004; Bauernhansl et al., 2016). For example, estimates of possible future scenarios for human skill and digital competency requirements vary widely, but all researchers agree that knowledge requirements will increase (Metternich et al., 2017; Tisch et al., 2013; Enke et al., 2015; Meudt et al., 2017).

In our opinion, the state, by funding appropriate development programs, can directly influence the level of digital literacy of the population, and as a consequence, the subjects of the labor market. The authors agree with the point of view that the verification of the efficiency of the use of state assets and budget funding is more than a test of the appropriateness of the use of funds, the results of such an audit are the basis of trust in public institutions that determine the way of life of society. Thus, auditing the use of state assets and budget funding in digitalization and E-Government is a means of ensuring trust in government (Ferry and Midgley, 2022). But because audits, as an evaluation of the effectiveness of the use of funds, are conducted after the activity has taken place, the question of whether the audit meets public expectations remains relevant (Canning et al., 2018; Jeppesen, 2019). In terms of increasing accountability, public agencies need clarity about what authority they have, where and how they spend money, and what citizens got for it. (Bracci et al., 2015; Mounk, 2018).

3. Methodology

Methodology and research methods. General scientific approaches - dialectical and systemic, which allowed to consideration of the processes under study in development, determine the driving contradictions of the processes under study, as well as identify the content and form of the phenomena under study, were used as methods of research in the work.

As special methodological tools, the study used experimental, empirical and heuristic methods to analyze factors and identify problems in budget financing in the field of digitalization and E-Government in Kazakhstan. The main source of data is the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan.

4. Findings (Main part)

The degree and nature (positive and negative) of the impact of digitalization on socio-economic development is determined by a set of factors such as: the competence of management personnel, skills and qualifications of developers of digital technologies, quality of the regulatory and legislative framework, availability

and quality of information and communication infrastructure and others.

To assess the effectiveness of the volume of investment in the field of digitalization, affecting, inter alia, the socio-economic development, based on official data since 2013, we considered the ratio of such qualitative performance indicators as export and import of goods related to information and communication technologies (hereinafter-ICT) and can be stated that:

Compared to other countries with sufficiently developed economies, the share of exports of ICT goods in Kazakhstan in total exports remains extremely low.

The data of comparative analysis of the countries with developed digital economy in terms of the share of export and import of information and communication technologies in total export and import of goods with similar indicators of Kazakhstan for the period 2013–2020 are presented in **Table 1**.

Table 1. Share of export and import of information and communication technologies in the total volume of export and import of goods for the period 2013–2020, %.

Country	Share of ICT goods exports in total goods exports	Share of ICT goods imports in total goods imports
Singapore	33.7	32.9
South Korea	28.9	17.9
China	27.1	25.1
Israel	14.0	10.3
Latvia	10.9	10.8
Estonia	9.5	7.6
Republic of Kazakhstan	0.1	7.3

Source: composed by the authors based on data from the World Development Bank (2023).

The volume of total expenditure on ICT for the period 2013-2020 was 8,417.46 million US dollars (2,484,856.4 KZT million), including expenditure of public administration—1,094.27 (310,668.2 KZT million) or 13% of the total; private sector—87% and it shows the undoubted interest of business in digitalization and ICT development.

Against the background of growth of total ICT costs, which in 2020 increased by 407.02 million US dollars (168,080.8 KZT million) or 76% compared to 2013, the lion’s share falls on payment of third-party organizations and specialists (outsourcing) related to information technology—2,360.19 million US dollars (696,732.9 KZT million) or 42.5%. The cost structure is presented in more detail in **Figure 1**.

In addition, relatively significant costs are associated with the purchase of software tools used on the basis of a license agreement, their share at the end of the analyzed period was 16.6% with a positive growth dynamic (2013—9.7% and 2020—16.6%).

It should also be noted that the need for IT specialists increased by 63% in 2020 in comparison with 2013 (2013—4449 people, 2021—7038 people).

On the contrary, independent software development within the organization and employee training associated with the development and use of ICT at the end of 2020 accounted for a relatively low share in the structure of total costs (4.4% and

0.3% respectively), in the latter case with negative dynamics of the indicator (2013—1.5% and 2020—0.3%).

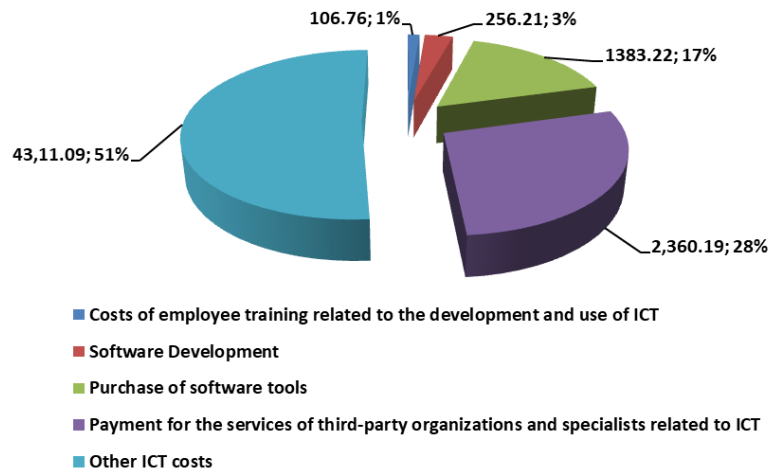


Figure 1. ICT expenditures in Kazakhstan for the period 2013–2020 and their structure, million US dollars.

Source: composed by the authors based on data from Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan.

The analysis of the volume of production and sales of goods (services) of ICT industry in the total GDP for the period from 2016 to 2020 showed a steady growth trend, which reached the level of 4.8% of GDP at the end of 2020.

Data on the share of production and sale of goods (services) of ICT industry in the total GDP of Kazakhstan for 2016–2020 are shown in **Figure 2**.

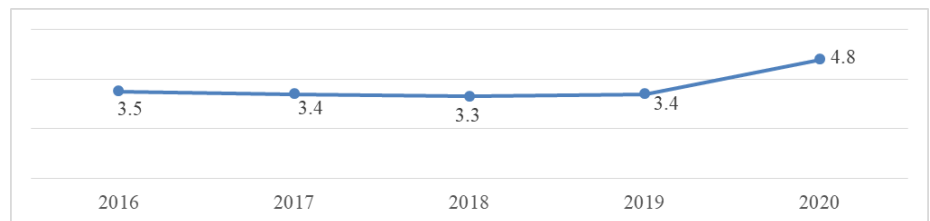


Figure 2. Data on the share of production and sale of goods (services) of ICT industry in the total GDP of Kazakhstan for 2016–2020, %.

Source: composed by the authors based on data from Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan.

The total volume of GDP in Kazakhstan in the considered period of 2016–2020 was:

- 2016: 137,278.32 million US dollars;
- 2017: 166,806.31 million US dollars;
- 2018: 179,337.81 million US dollars;
- 2019: 181,665.91 million US dollars;
- 2020: 171,083.75 million US dollars.

In the structure of industrial production in 2020, a significant share of ICT accounts for the production of computers and peripherals—54.3% (or 34.30 million US dollars) with an increase of 24.92 million US dollars for the period 2016–2020

(an increase of 341.2%), 36.1%—the production of communication equipment (or 22.83 million US dollars) (see **Table 2**).

Table 2. Volume of industrial output (goods and services) of ICT industry in Kazakhstan, million US dollars.

Category Name	2016	2017	2018	2019	2020
Manufacture of electronic elements and boards	0.47	0.38	0.03	1.12	0.47
Manufacture of computers and peripheral equipment	9.38	8.61	10.55	14.47	34.30
Manufacture of communications equipment	26.44	19.25	17.08	33.91	22.83
Production of consumer electronics devices	30.36	36.93	37.64	29.60	5.56
Total by ICT sector	66.65	65.17	65.30	79.10	63.16

Source: composed by the authors based on data from Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. (Department of Statistics Services and Energy, 2021).

At the same time, it is important to note that in this case there is a substitution of the notions of “production” and “assembly”, as the industrial assembly of computer equipment under the ZIK Computers brand uses components of such foreign partners as Great Wall (30 years in the computer equipment market), Windows (licensed operating system), Intel (processor) and many others. It should also be noted that the brand is not popular and its purchases are mostly for government orders, which in our opinion is not an efficient use of budget funds.

In addition, the low share of electronic elements and boards in the industrial production structure of the ICT industry—0.74%—is also noteworthy. The volume of this group of goods at the end of 2020 was 0.47 million US dollars.

It should be noted that in dollar terms the volume of industrial output (goods and services) of the ICT industry in Kazakhstan over 5 years almost did not change. The digital divide is reduced by providing access to the Internet for economic entities. Thus, over the period 2016–2020, the share of organizations with access to the Internet (excluding public administration organizations) increased by 12.2%, reaching 81.6% by the end of 2020.

The results of the analysis of official statistics, analytical materials and information obtained through feedback channels with service recipients (including feedback and comments on Instagram, Facebook, etc.) show that despite the measures taken by the state to expand Internet coverage (according to official data for 2020, the share of households with Internet access is 92.4%, 20 thousand km of fiber-optic communication lines (FOCL) were laid), Kazakhstan still has the problem of insufficient Internet coverage and provision of access to high quality.

The problem of quality access to the Internet was particularly acute during the pandemic and quarantine, when mass Internet traffic and demand from the population overloaded the available capacity and led to frequent failures and “freezes” of information systems (interruptions in access to the Egov website due to transfer to this platform of many functions of Population Service Centers; “freezes” of the “Enek.kz” Labor Exchange website, as a result of mass application of population for payment of social allowance). A lot of complaints and censures during this period were about the distance system of secondary education, as many parents and students could not connect to classes not only in the villages, but also in

the cities.

In addition, the relevance of the low speed of the Internet was not lost. As evidenced by the feedback channels (feedback on social networks Instagram and Facebook), the population, even in a megalopolis like Almaty, is still forced to use ADSL (Asymmetric Digital Subscriber Line) connection with a speed of no more than 8 Mbps, which is characterized by frequent losses and failures compared to fiber-optic networks.

It should be noted that there is still an unresolved issue of unfair business model of telecom operators throughout Kazakhstan, according to which consumers of fixed Internet are contracted to provide Internet connection with the same parameters, but the actual Internet connection turns out to be worse.

The current legislation does not regulate this issue, and telecom operators do not bear administrative responsibility for the significant discrepancy between the declared in the contract and the actual parameters of the Internet connection. At the same time telecom operators continue the practice of providing services on access to fixed Internet with the use of conditional conditions, such as “Internet speed up to 200 mbps”, which makes it impossible to make complaints about insufficient speed of the Internet.

It is known that development of e-commerce stimulates not only an increase of domestic and foreign trade but also contributes to the growth of non-cash payments, thereby reducing the transaction costs of business and the volume of shadow turnover in the country. Thus, the growth of non-cash payments through digital technology (by 2019), at the end of 2020 was 75.3%. According to official statistics, the total volume of the e-commerce market (E-commerce) at the end of 2020 exceeded 2.91 billion US dollars (1.2 KZT trillion), which is double the value of the same indicator for 2019.

The growth of e-commerce in Kazakhstan is provided mainly by access to such global Internet sites as Amazon, Ozon, e-Bay, Alibaba, Wildberries, etc., which limits more active development of local e-commerce. Rising prices for cross-border goods have a negative impact on residents with low and low incomes, who pay for the delivery services of domestic and foreign postal operators in addition to the cost of goods and customs duties. In this regard, improving the competitiveness of domestic e-commerce sites is important from the point of view of national security, since cross-border e-commerce is the most price-dependent segment of e-commerce.

Certain problems with the proper assessment of the impact of digitalization on socio-economic development are due to the fact that government agencies do not have accurate information on the supervised areas of economic development, which would allow the full and adequate implementation of state policy on competence, and mainly rely on official statistical data. It should be noted that, in our opinion, the intensification of the impact of digitalization on the socio-economic development of Kazakhstan at the expense of public funding is controversial. Government spending (budget funding) on ICT in Kazakhstan for 2013–2020 in the amount of 1094.27 million dollars stimulated only 542.99 million dollars, that is only 49.62%, but the total investment was 8417.46 million dollars, which is only 6.45%.

In the context of corporate and public sectors, it should be noted that the share of large and medium-sized industrial enterprises using digital technology increased

by 1.9% (2019—5.9%, 2020—7.8%) over the past two years both in Kazakhstan as a whole and in the regional context (the largest share of such enterprises is in the Atyrau (15.2%), West Kazakhstan (12.9%), Kyzylorda (12.1%), East Kazakhstan (11.1%) and Karaganda (11%) regions.

Due to the rapid pace of digital technology, new generation computers and other gadgets, the level of digital literacy of the population aged 6–74 years in Kazakhstan has increased, reaching 84.1% by the end of 2020.

In Kazakhstan, 78.7% of users use the Internet for posting information or instant messaging, 71.8%—for participation in social networks, 62.3%—for downloading movies, images, music, watching videos, listening to music, playing or downloading games, 38.6%—for getting information about goods and services, and 36.1%—for sending and receiving e-mail. Thus, the Internet is mostly used by the population for leisure rather than business life or self-education.

There is a certain problem of Kazakhstani society's perception of mobile and fast access to government digital services as a matter of course, rather than an institutional advantage provided by the state. The population takes for granted this level of digitalization in Kazakhstan. Most citizens are not able to compare the level of access to services for obtaining necessary certificates and documents in other countries and consider the work of the government to be insufficiently effective. In our opinion, we can overcome this cognitive barrier to promote digitalization and e-government only by conducting appropriate explanatory work. Also in our opinion, it is necessary to provide statistics on Kazakhstan and other countries in comparison on the E-gov portal itself, showing exactly the advantages of Kazakhstan, for example, to supplement the section Electronic government of the Republic of Kazakhstan (Electronic government of the Republic of Kazakhstan, 2021).

Much more optimistic is the state of e-government in Kazakhstan. Reports from government agencies show that there are positive trends and objectively good and measurable results in the digitalization and accessibility of government in Kazakhstan. Kazakhstan for 2022 ranks 28th in the UN global ranking on the level of e-government with an index of 0.8628 (193 countries in the world were taken into account) (United Nations Department of Economic and Social Affairs (UNDESA), 2022). It should be noted that in 2005 Kazakhstan ranked only 65th in this rating, i.e., we can conclude about a systematic and successful transition to “digital mode”. The rating of countries on the level of e-government development (E-Government Development Index)—calculated by the United Nations (UN)—evaluates the readiness and capabilities of national government structures to use information and communication technologies (ICT) to provide citizens with public services. The main components of this index are a degree of coverage and quality of Internet services, level of ICT infrastructure development and human capital (NONEWS, 2020).

At the end of 2020, Kazakhstan ranked 29th among 193 countries, the data of other countries, sampled for 2020, are shown in **Figure 3**.

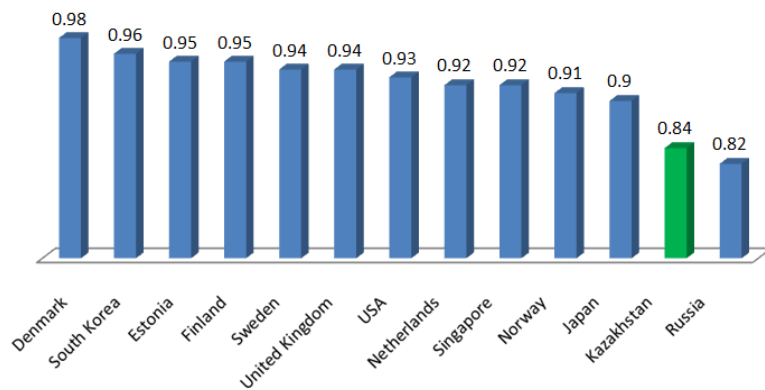


Figure 3. Data on the share of production and sale of goods (services) of ICT industry in the total GDP of Kazakhstan for 2016-2020, %.

Source: composed by the authors based on data from The United Nations E-Government Development Database.

According to this indicator Kazakhstan is significantly inferior to such countries as Israel (30th place), Russia (36th place), China (45th place), Uzbekistan (87th place), India (100th place), etc.

Relatively confident position of Kazakhstan and in the world ranking of network preparedness, where the country occupies 56th place among 134 countries, leaving behind such countries as Turkey (57th place), Ukraine (64th place), Belarus (65th place). Networked Readiness Index is a composite index, which is calculated by Portulans Institute together with the World Information Technology and Services Alliance and characterizes the level of development of information and communication technologies (ICT) and network economy in 134 countries around the world. This index measures the level of ICT development according to 62 benchmarks grouped into four main groups: technology, people, governance, influence (Portulans Institute, 2021).

We can conclude that consistent funding for the development of E-Government in Kazakhstan has allowed it to enter the top 30 countries in the world, for example, for the period 2013–2020, the total amount of budget financing amounted to 469.58 million US dollars.

5. Discussion

In modern society, digital information about spatial data has become an important strategic resource of public administration and has become the key to its sustainable socio-economic development. Kazakhstan has accumulated a large volume of data from the production activities of various enterprises. However, the large volume and unstructured nature of the accumulated body of data creates an information barrier, and sometimes hinders the processes of information exchange and management on the basis of this information. New market requirements for location information and the development of information technology necessitate the search for new solutions. We see the way out of this situation in the creation of conditions that ensure consumer access to spatial data in electronic form and their effective use.

The key measure should be the implementation of the “Digital by default” principle, which provides for the planning and subsequent provision of public services exclusively in electronic form, with the expansion of self-service opportunities.

The effectiveness of government agencies depends on the level of automation of processes related to the execution of daily routine operations, such as personnel, accounting, budget planning, planning and execution of public procurement, correspondence with other government agencies, and so on. In order to ensure effective interaction between government agencies and adherence to the principles of “paper free”, it is planned to develop a business process management system built on the principles of cloud computing with further development into a digital repository. Work on the automation of such typical tasks will be continued mainly on the service model of informatization.

According to the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, in 2022 Kazakhstan entered the top 30 most digitally developed countries in the world. In the world ranking, Kazakhstan ranks 51st in the ICT Development Index and 58th in the Network Readiness Index. By 2025, the government of Kazakhstan plans to be among the top 20 in the UN e-Government Development Index, among the top 50 in the B2C (Business to Consumers) e-commerce index and among the top 40 countries in the Information and Communication Technology Development Index.

The volume of programming, consulting and other related services in Kazakhstan totaled KZT 772 billion (approximately \$1.67 billion at the average dollar-to-KZT exchange rate for 2022), up 19.5% from a year earlier.

The largest economic and IT centers are the cities of Astana and Almaty: companies from these cities produce 41.5% and 49% of IT services, respectively. The number of companies engaged in software development and IT consulting services has increased 2.7 times in the last 4 years, according to the study for 2022.

The Ministry of Digital Development, Innovation and Aerospace Industry of Kazakhstan has developed a digital code to address the problems of IT industry regulation. KZT 120 million (about USD 263 thousand) is allocated for this project. The codification will make the application of laws in the digital environment accessible and understandable for citizens and businesses, eliminating burdensome requirements and regulatory barriers. The pace of development and the scale of spread of digital technologies impose new requirements not only to the speed of adoption of regulatory acts, but also to the structure of legislation. The adoption of the Digital Code will make it possible to form a unified legal space for the development of the digital economy and the digital transformation of public administration.

Some of the main barriers to the development of digitalization in Kazakhstan by November 2023 are:

- cumbersome, contradictory and unstable legislation;
- excessive regulation of the functions of state bodies and administrative procedures at the legislative level, which deprives authorized bodies of independence, as well as the ability to make prompt decisions on the optimization of external and internal business processes, implementation of best

practices and digital solutions;

- legislative gaps in the regulation of digital human and civil rights;
- uncontrolled use of big data, AI data processing algorithms, and the Internet of Things for digital surveillance;
- lack of a unified legislative framework regulating the activities of digital service providers.

In our opinion, the adoption of the Digital Code will set a sustainable vector of technological progress in Kazakhstan. The focus should be on the introduction of artificial intelligence technologies in such important industries as oil and gas, energy, agriculture, transportation and logistics. Artificial intelligence can significantly optimize the process of transformation of Kazakhstan's cities into full-fledged smart cities, favorable for living and working. For this purpose, it is necessary to ensure the construction of data centers specializing in artificial intelligence. It is also necessary to deploy 5G networks in all regional centers.

6. Conclusion

6.1. Assessment of the impact of digitalization on the socio-economic development of Kazakhstan

Over 20 years of state initiatives in Kazakhstan, a modern system of effective and point tools for measuring the digital economy and assessing the impact of digitalization on socio-economic processes has not yet been fully formed. In our opinion, it has not been possible to create a progressive infrastructure of information technology, quality institutions, influencing to a certain extent the performance of created start-ups of a technological nature and the development of human resources potential. The conditions for the favorable development of the business environment, improving the quality of education and innovation in the field of information and communication technologies are not sufficiently elaborated.

Statistical data suggest that Kazakhstan's transition to a digital economy is still based on a "catch-up" model of development, which relies on the purchase of off-the-shelf software and preferential payment for the services of outside organizations and specialists in information and communication technologies. Official statistical data confirm the dependence of the domestic digital industry on foreign IT developments and specialists.

This situation underscores the need to revise the cost structure from the position of training a sufficient number of domestic specialists with the appropriate competencies and capable of competently and independently servicing Kazakhstan's digital economy in the future in the context of ensuring national security.

Against the background of many years of substantial state investment in digitalization, the unacceptably low share of information and communication technology goods in total exports indicates an unsatisfactory level of competitiveness of both domestic information and communication goods in the domestic and foreign markets, and the failure of Kazakhstan's industry as a whole. All this creates obstacles to receiving dividends from the digital economy.

The impact of digitalization on the social sphere, including the education and

health systems, was most clearly demonstrated in the period of the pandemic threat, which highlighted the existing problems.

Authorized central government agencies and organizations did not properly analyze and monitor the developed and implemented information systems, as well as their accounting, which had a negative impact on the effectiveness of implementation of state policy in the field of informatization and digitalization of the country.

Authorized central government bodies and organizations did not properly analyze and monitor the developed and implemented information systems, as well as their accounting, which had a negative impact on the effectiveness of the state policy in the field of informatization and digitalization of the country.

To a certain extent, the lack of proper control was influenced by the lack of a systematic approach to state planning in the development and approval of state programs for the development of informatization and digitalization. In turn, as a result of the constant reorganization of state bodies, the continuity of the further implementation of certain goals and objectives of state programs, including those related to informatization and digitalization of the country, is not properly ensured.

6.2. Development of e-government in Kazakhstan

Digital transformation is leading to new business models, including so-called proactive, data-driven services. The more service providers know about their customers, the more personalized offerings they can create, providing services that will best meet customers' needs and even anticipate needs that customers themselves may not yet know about. This will make it possible to provide services to citizens and entrepreneurs by anticipating the need for a particular service based on transaction analysis.

Transition to the principles of open architecture (Open API), which will build a qualitatively new level of cooperation with the commercial sector, should become a key direction for transforming approaches to service provision and interaction of the state with citizens and businesses. This will allow the efficient use of resources by focusing on digital infrastructure, giving the "last mile" of government services to the non-governmental and business community. At the same time, non-governmental information resources will be the front-end, integrating government services into their own ecosystems where citizens and entrepreneurs can initiate and receive government services.

It is necessary to implement a management model where it is not the citizen who turns to government agencies for services, but the state, understanding the needs of citizens, contacts them to provide public services without the need to physically visit institutions.

We can distinguish 3 priorities of Kazakhstan's digital transformation. Kazakhstan acts as an attractive space for the development of innovation, digital production and creativity. This is especially important in light of the current geopolitical situation and macroeconomic challenges. At the same time, digital transformation is one of the determining factors of competitiveness of both individual companies and large regions.

Priority 1: human-centeredness. It is about providing modern services to citizens in the most accessible and fastest way possible. In particular, it is possible to plan a transition to a qualitatively new format of digitalization of public administration—Invisible Government. The essence is that the main focus of public policy is centered on the individual, his needs and interests. All public services will be transferred to the electronic format as much as possible. On the other hand, the population takes for granted this level of digitalization and, not being able to compare the level of access to services for obtaining necessary certificates and documents in other countries, considers the work of the government to be insufficiently effective.

Priority 2: creating favorable conditions for the IT industry, including the development of E-commerce. Kazakhstan can try to become a leading player in the sphere of new digital technologies, crypto-industry, as well as regulated and transparent digital mining. The development of the IT sector is an important area of government activity. It is necessary to create conditions for attracting international capital to Kazakhstan's digital ecosystem, as well as to provide opportunities for quality education.

Priority 3: development of the digital economy and Industry 4.0. This direction implies innovation grants and tax preferences for technological innovation and digital decision-making. To further develop the digital economy, the government will have to introduce new support measures in a timely manner.

The realization of such large-scale tasks is impossible without the active intervention and support of the government of Kazakhstan, including the need to amend legislation, as well as providing residents of the most remote areas with access to the Internet via low-orbit satellite systems.

At the same time, it is necessary to plan the integration of currently disparate information systems and communication channels to implement the omnichannel service model by creating a single “front-office” aimed at ensuring the availability of information and services at any time, in any place and on any device (contact center, web portal, intelligent messengers, mobile applications, SMS messages).

The transition to this model will allow citizens to start a service from one channel (portal, mobile app, or contact center) and complete it in another channel (for example, signing up will be in a population service center).

The primary key principle for improving all processes (G2C, G2B, G2G) will be the implementation of “paper-free” interaction—the exclusion of paper-based document flow, the transition to the “one statement” principle. Accordingly, to exclude processes in which information is presented on paper, systematic work on the analysis of processes, the description of life situations and the integration of information systems will be carried out.

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